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COMMUNITY WATER SUPPLY STUDY, CHARLESTON, SOUTH CAROLINA. STANDARD METROPOLITAN STATISTICAL AREA

Bureau of Water Hygiene
Cincinnati, Ohio

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FINAL DRAFT

COMMUNITY WATER SUPPLY STUDY

CHARLESTON, SOUTH CAROLINA

Standard Metropolitan Statistical Area

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FOREWORD

Evaluation of water supplies in the Charleston, South Carolina Standard Metropolitan Statistical Area was conducted as a part of a nationwide community water supply study.

The Charleston Statistical Area was selected because of its history of bacteriological and chemical quality problems, its coastal location, and the fact that community supplies range from very small well systems to a large surface source. The entire metropolitan area (defined by the U. S. Department of Commerce, Bureau of Census, as all of Berkeley and Charleston Counties) was included to allow assessment of drinking water for the central city, suburbs, and small rural fringe communities. Field investigations began in February 1969 and were completed on March 7, 1969. Review of water supply records continued until June 1969.

We wish to acknowledge the fine cooperation of the South Carolina State Board of Health's Bureau of Sanitary Engineering - Water Supply Division, the many man-hours provided by the Berkeley and Charleston County Health Department Sanitarians - particularly - the District Sanitation Director, and the water supply officials; all of whom helped to make this study possible.

Gary D. Hutchinson
Water Hygiene Representative

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SUMMARY OF FINDINGS AND CONCLUSIONS

The Bureau of Water Hygiene conducted a nationwide Study of Community Water Supplies in 1969 with the cooperation of state and local health departments and water utilities. Eight geographically distributed Standard Metropolitan Statistical Areas (SMSA) and the State of Vermont were chosen to assess the status of drinking water quality, water supply system facilities and surveillance programs in urban and suburban areas. Charleston, South Carolina was one of the metropolitan statistical areas selected for study.

The Charleston, South Carolina SMSA survey included twenty community and two special water systems. Of the 296,000 population residing in the two county area, 85 per cent are served by these water systems. The Charleston municipal water system serves 75 per cent of the area's population and about 90 per cent of all those served by community systems. Charleston obtains most of its water from the Edisto River. Three systems purchase finished water from Charleston and the remaining eighteen use ground water.

THE PRINCIPLE FINDINGS OF THIS STUDY ARE AS FOLLOWS:

1. All water systems were found to have deviations in at least one major criteria of the PHS Drinking Water Standards (DWS).
2. Seven water systems serving 230,940 people were found to exceed the bacteriological water quality criteria of the DWS (Section 3) while all water systems were found to be in violation of the bacteriological sampling criteria of the DWS.
3. Eight water systems serving 10,121 people were found to exceed the mandatory chemical water quality criteria of the DWS (Section 5).
4. Twelve water systems serving 23,448 people were found to have inadequate source, protection or treatment as documented under Section 2.1 of the DWS.
5. Nineteen water systems serving 26,784 people were found to have inadequate operational procedures (cross-connection control, qualified personnel, and quality control) as documented under Section 2.3 of the DWS.

In addition to these major factors, several other findings are noteworthy. Brackish water, high cost, and taste and odor lead the list of customer complaints. There was little or no relation between the cost of water, size of the system, or rating of the system.

Discussions with local and State Health Authorities failed to turn up any positive information on the incidence of waterborne disease for the area. This substantiates the assumption that there has been

no waterborne disease outbreaks of epidemic proportion, however, it should not be construed as meaning that the area is entirely free of waterborne illness. It does point up the need for a stronger epidemiological investigation program.

Few of the area's water supply needs are recognized by water works management. Nine of the systems reported no planning activities. Those systems reporting planning activity did not have full knowledge of all of their deficiencies.

The poor quality of ground water along the coast will eventually require the coastal communities to look elsewhere for their water - as Folly Beach has already done - or to institute advance treatment - perhaps desalinization.

It is desirable that those communities in close proximity to Charleston take every opportunity to utilize the city system as a water supply source. This will result in not only better water but, in many cases, actual economy in the long run.

Those systems purchasing water from the City of Charleston should be cognizant of the limits of the City's responsibility and their responsibilities as a water purveyor. It would probably be preferable in most cases to enter into agreements with the City of Charleston for many routine waterworks functions such as, quality control surveillance, laboratory support, record keeping, cross-connection control, etc.

RECOMMENDATIONS

It is recommended that:

A. The South Carolina State Board of Health increase its surveillance of community water supply systems to at least the level set forth in the PHS Drinking Water Standards and the Manual for Evaluating Public Water Supplies. This should include (but not necessarily be limited to) thorough periodic sanitary surveys of each system, complete routine chemical analysis, and - in the case of the smaller systems having no laboratory capability - bacteriological surveillance sufficient to meet the Standards. It is estimated that the Water Supply Division needs at least 15 additional full time professional people to implement such a program.

B. Priorities and a time schedule be established for improving those community water systems having deficiencies. Disinfection should be provided for each public supply. Studies are needed to determine the most feasible method of providing an alternate source of water for those systems having an undesirable water supply. The ultimate objective is to have all systems fully approved to insure a safe, healthful drinking water for each and every customer in sufficient supply to meet all needs.

C. Future residential development be coordinated with advance water resource planning to insure an adequate and satisfactory

water supply. Wherever feasible, new suburban development should be required to connect to existing water systems.

D. All key waterworks personnel be certified. Perhaps a new distribution certification is needed.

E. The State Board of Health initiate a program to encourage better waterworks record keeping - one which will involve key waterworks management.

F. Epidemiological investigation and reporting of possible waterborne disease receive additional emphasis.

INTRODUCTION

The purpose of the Community Water Supply Study (CWSS) was to determine if the American consumer's drinking water met the Drinking Water Standards.* To obtain nationwide coverage, the Bureau of Water Hygiene of the U. S. Public Health Service initiated the CWSS in February of 1969 in nine areas across the country. The field work for the CWSS was conducted by the Bureau of Water Hygiene, in cooperation with the state and local health departments and the water utilities.

This study was designed to give an assessment of drinking water quality, water supply systems, and surveillance programs in urban and suburban areas in each of the nine regions of the Department of Health, Education, and Welfare. These areas were selected to give examples of the several types of water supplies in the country. A whole Standard Metropolitan Statistical Area (SMSA) was the basis of each study, except in Region I where the entire State of Vermont was included, with evaluations made on all public water supply systems, as defined herein, in each study area. This coverage allowed an assessment of the drinking water quality of the large central city, the suburbs, and the smaller communities located in the counties in the SMSA, and the interaction between them.

Specifically, the objectives of this study were accomplished by determining whether or not:

1. The quality of the urban and suburban American consumer's drinking water in the selected study areas

*1962 U. S. Public Health Service Drinking Water Standards; PHS Publ. No. 956, Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, 61 pp

exceeded the Constitutent Limits of the Drinking Water Standards (DWS);*

2. The water supply systems supplying this drinking water to the consumers were essentially free from major deficiencies;

3. The bacteriological surveillance programs over these water supply systems meet the established criteria.

The authority for the Community Water Supply Study is found in Title III, Part A, Section 301, Public Health Service Act, amended (42 U. S. C. 241).

> "Section 301 - The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification..."

SCOPE

Public water supplies in the United States numbered 19,236 serving some 150,000,000 people when last inventoried in 1963.* The remaining 50,000,000 people had private water supplies. Most of the public water supplies were small, about 85 percent serving 5,000 or less people. About one-half of the public was served by the 18,837 supplies that each served 100,000 or less persons and the other one-half (77,000,000) were served by the 399 larger supplies. About 75 percent of these public water supplies have ground water as a source, while 18 percent use surface water. The remaining 7 percent have a mixture of ground and surface water source.

Systems Studied

This study covered 969 public water supply systems, including 885 community water supply systems (91.3% of the total) and 84 special water supply systems (8.7% of the total). For this study the following definitions of the system were used.

> PUBLIC WATER SUPPLY SYSTEM - A water supply system includes the works and auxiliaries for collection, treatment, storage, and distribution of water from the sources of supply to the free-flowing outlet of the ultimate consumer. Water supply systems were included in this study, if they had 15 or more service connections and/or served 25 or more consumers.
>
> > Special Water Supply Systems - are those systems serving trailer and mobile home parks, other tourist accommodations, and institutions with resident populations.
> >
> > Community Water Supply Systems - are all other systems studied in an SMSA.

*Statistical Summary of Municipal Water Facilities in the United States, January 1, 1963; PHS Publ. No. 1039, Government Printing Office, Washington, D. C. 1965, 66 pp.

In this Region 22 public water supply systems (2 percent of the national study total) were studied serving about 251,000 persons (1.4 percent of the national study total). They consisted of 18 ground water systems (wells and springs), one surface water system, and three systems buying finished water from another system, hereafter called wholesale finished water source systems.

For the purpose of this report, water supply systems were divided into four categories; 1) those using surface water or a mixture of surface and ground water as a source; 2) those using ground water as a source (this category was further divided into; a) wells, b) springs, and c) springs and wells); and 3) those purchasing finished water as a source; and 4) special water supply systems. Table I gives data on type, population, average daily demand, and source for the supplies included in this study. Table II shows the number of systems in each category and the populations served.

Study Area

The details of the study area and the definition of Standard Metropolitan Statistical Area (SMSA) are given below.

> STANDARD METROPOLITAN STATISTICAL AREA -- The boundaries and titles of standard metropolitan statistical areas are established by the Bureau of the Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas. An SMSA is a county or group of contiguous counties, which contains at least one city of 50,000 inhabitants or more or "twin cities" with a combined populations of at least 50,000. In addition to the county, or counties, containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city.

TABLE I
WATER SYSTEMS STUDIED
CHARLESTON, SOUTH CAROLINA SMSA

NAME OF SUPPLY	TYPE	POPULATION SERVED	AVERAGE DAILY DEMAND MGD	SOURCE
Ashcroft Hall	Community	85	0.044	Finished
Berkeley C. Club	Community	260	-	Ground
Caromi Village	Community	140	0.009	Ground
Charleston*	Community	220,000	25.000	Surface
College Park	Community	200	0.010	Ground
Dunmovin	Community	150	-	Ground
Edisto Beach W. Co.	Community	150	-	Ground
Elm Village Trailer Ct.	Special	141	-	Ground
Folly Beach	Community	2,000	0.080	Finished
Ft. Johnson Med. Col.	Special	25	0.005	Ground
Goose Creek	Community	7,200	1.580	Ground
Isle of Palms	Community	4,300	0.350	Ground
Land-o-Pines	Community	36	-	Ground
Moncks Corner	Community	4,200	0.200	Ground
Mt. Pleasant	Community	7,500	0.600	Ground
Orleans Woods	Community	225	0.010	Finished
Parish Place	Community	80	-	Ground
Pinopolis	Community	500	-	Ground
St. Stephen	Community	1,600	0.130	Ground
Sullivan's Island	Community	1,692	0.090	Ground
W. C. of Edisto Beach	Community	500	0.020	Ground
Wheeler W. Co.	Community	100	-	Ground

*Interstate Carrier Water Supply

Note: Under the "Source" heading, the word "Finished" means that the system purchases finished water from another water system.

TABLE II-A

WATER TREATMENT PRACTICES IN THE SYSTEMS STUDIED

Treatment Practice	Type of System (Number of Systems of each)						Overall System Totals	
	Surface Water & Mixed Source	Ground Water Source			Wholesale Finished Water Source	Special Systems	Number	Percent
		Springs	Wells	Mixture of Both				
Do not disinfect, clarify, or buy, chlorinated water	0	0	11	0	0	2	13	59
Disinfection only or buy chlorinated water	0	0	4	0	3	0	7	32
Clarification* and disinfection	1	0	1	0	0	0	2	9
Clarification* without disinfection	0	0	0	0	0	0	0	0
System Totals Number	1	0	16	0	3	2	22	-

*Clarification is the removal of suspended material by coagulation, sedimentation and/or filtration

TABLE II-B

WATER TREATMENT PRACTICES IN THE SYSTEMS STUDIED

Treatment Practice	Population Served in Thousands (Number of Systems of Each)							Overall System Totals	
	< .5	.5-5	5-10	10-25	25-50	50-100	> 100	Number	Percent
Do not disinfect, clarify, or buy chlorinated water	11	2	0	0	0	0	0	13	59
Disinfection only or buy chlorinated water	3	3	1	0	0	0	0	7	32
Clarification* and disinfection	0	0	1	0	0	0	1	2	9
Clarification* without disinfection	0	0	0	0	0	0	0	0	0
System Totals - Number	14	5	2	0	0	0	1	22	-

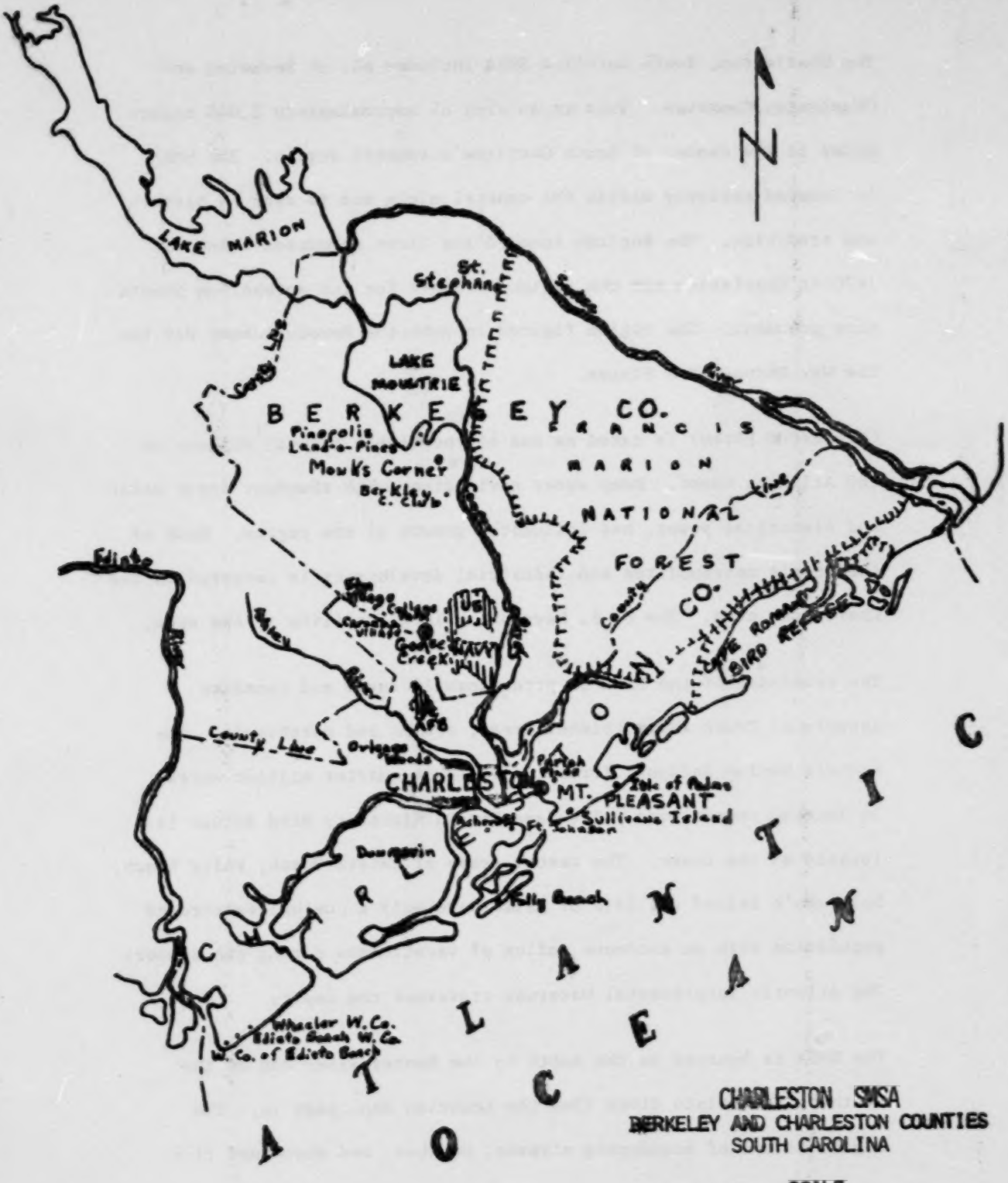
*Clarification is the removal of suspended material by coagulation, sedimentation and/or filtration.

The Charleston, South Carolina SMSA includes all of Berkeley and Charleston Counties. This is an area of approximately 2,045 square miles in the center of South Carolina's coastal region. The SMSA is located entirely within the coastal plain and is rich in history and tradition. The English founded the first permanent colony in 1670 at Charleston and the region is known for its antebellum plantation grandeur. The region figured in both the Revolutionary War and the War Between the States.

Charleston Harbor is rated as one of the finest natural harbors on the Atlantic Coast. Deep water navigation, with abundant fresh water and electrical power, has influenced growth of the region. Much of the area's metropolitan and industrial development is centered in the Charleston area. The U. S. Navy has a large facility in the area.

The remainder of the SMSA is predominantly rural and consists largely of truck farms, timber areas, swamps and marshlands. The Francis Marion National Forest, covering a quarter million acres, is located in the area. The Cape Romain Migratory Bird Refuse is located on the coast. The resort areas of Edisto Beach, Folly Beach, Sullivan's Island and Isle of Palms have only a nominal year-round population with an enormous influx of vacationers during the summer. The Atlantic Intercoastal Waterway traverses the coast.

The SMSA is bounded on the north by the Santee River and on the south by the Edisto River (See the Location Map, page 14. The region is one of meandering streams, marshes, and abandoned rice



CHARLESTON SMSA
BERKELEY AND CHARLESTON COUNTIES
SOUTH CAROLINA

SCALE
1-INCH EQUALS APPROX. 11 MILES

fields. The downstream end of Lake Marion and the 95 square mile Lake Moultrie (owned and operated by the South Carolina Public Service Authority) are located in the northwest corner of the SMSA. Charleston Harbor is formed by the Cooper, Ashley and Wanda Rivers. The tailrace canal of the Santee-Cooper hydroelectric and navigation project discharges to the Cooper River at Lake Moultrie. The Edisto River is formed by the confluence of the South and North Forks near Branchville and flows about 118 miles to its mouth in St. Helena South. It is the principal source of water for the Charleston area and is considered to be an excellent water supply source. An additional water supply is available to Charleston from the Bushy Park Reservoir located on a branch of the Cooper River.

Ground water sources consist of two principal aquifers - a sandy limestone of Tertiary Age (250-500 feet) and a medium to course grained sand of the Cretaceous Age (1,600-2,000 feet). Water in the sandy limestone is brackish near the coast but becomes fresh a few miles inland. Water in the cretaceous sand has a low chloride content but its total dissolved solids generally exceed 1,000 mg/l.

The Bureau of Census estimates the 1969 population of the two county Charleston SMSA at 296,000. Population history of the area is shown below:

POPULATION
CHARLESTON, SOUTH CAROLINA SMSA

County	1940	1950	1960	1969
Berkeley	?	30,250	38,196	-
Charleston	121,105	164,856	216,382	-
	-	195,107	254,578	296,000

EVALUATION CRITERIA

Each water supply system was investigated on three bases: 1) drinking water quality was determined by sampling the finished and distributed water and returning these samples to the laboratories of the Bureau of Water Hygiene for bacteriological, chemical, and trace metal analyses, 2) the status of the water supply system facilities was determined by a field survey of the system and the gathering of data on three standard forms (four items were chosen to represent major problems; a) source(s), b) treatment, if any, c) distribution system pressures, and d) operation); 3) the status of the surveillance program over the water supply system was evaluated by obtaining bacteriological water quality data for the previous 12 months of record from state and county health department files.

Water Quality Criteria

Water quality was judged either:

1. Not to exceed the Constituent Limits of the DWS (hereafter called Does not exceed limits) or,
2. To exceed at least one "recommended" Constituent Limit (some are aesthetic parameters), but does not exceed any "mandatory" Constituent Limit (hereafter called Exceed recommended, but not mandatory limits) or,
3. To exceed at least one "mandatory" Constituent Limit (hereafter called Exceed mandatory limits).

The limits for the constituents measured in this study are summarized below.

RECOMMENDED LIMITS

(If the concentration of any of these constituents are exceeded, a more suitable supply or treatment should be sought)

Constituent	Limit
Alkyl Benzene Sulfonate (Measured as methylene-blue-active substances)	0.5 mg/l
Arsenic	0.01 mg/l*
Boron	1.0 mg/l**
Chloride	250 mg/l
Color	15 Units
Copper	1.0 mg/l
Carbon-Chloroform Extract (CCE)	0.200 mg/l
Cyanide	0.01 mg/l
Fluoride	
Temp. (Ann. Avg. Max. Day, 5 years or more)	
50.0-53.7	1.7 mg/l
53.8-58.3	1.5 mg/l
58.4-63-8	1.3 mg/l
63.9-70.6	1.2 mg/l
70.7-79.2	1.0 mg/l
79.3-90.5	0.8 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Nitrate	45 mg/l
Radium-226	3 uuc/l (pc/l)***
Strontium-90	10 uuc/l (pc/l)***
Sulfate	250 mg/l
Total Dissolved Solids (TDS)	500 mg/l
Turbidity	
Untreated	5 Units
Treated by more disinfection	1 Unit
Zinc	5 mg/l

MANDATORY LIMITS

(If the concentration of any of these constituents are exceeded, the further use of this water for drinking and culinary purposes should be evaluated by the appropriate health authority because water of this quality represents a potential hazard to the health of consumers.)

Constituent	Limit
Arsenic	0.05 mg/l
Barium	1.0 mg/l
Boron	5.0 mg/l**
Cadmium	0.01 mg/l
Chromium (hexavalent)	0.05 mg/l
Coliform organisms (Measured by membrane filter technique)	Fails std. if: a) Arithmetic average of samples collected greater than 1 per 100 ml
	b) Two or more samples (5% or more if more than 20 examined) contain densities more than 4/100 ml
Cyanide	0.2 mg/l
Fluoride	
Temp. (Ann. Avg. Max. Day - 5 years or more)	
50.0-53.7	2.4 mg/l
53.8-58.3	2.2 mg/l
58.4-63.8	2.0 mg/l
63.9-70.6	1.8 mg/l
70.7-79.2	1.6 mg/l
79.3-90.5	1.4 mg/l
Gross Beta activity (In the absence of α or Sr-90)	1,000 uuc/l (pc/l)***
Lead	0.05 mg/l
Selenium	0.01 mg/l
Silver	0.05 mg/l

*Although the recommended arsenic concentration is 0.01 mg/l, because of interferences in some waters, the concentration of arsenic was only determined to be less than 0.03 mg/l. For the purposes of this study, these waters were considered not to exceed the recommended standard.

**Proposed for inclusion in the Drinking Water Standards.

***If these limits are exceeded, refer to Section 6.2 of the DWS.

Facilities Criteria

Source, treatment, operation, and distribution facilities were judged either:

1. To be essentially free from major deficiencies, or
2. To have one or more of the following major deficiencies (where applicable)
   a) Inadequate source protection (in absence of disinfection or buying chlorinated water)
   b) Inadequate disinfection (if disinfection practiced)
   c) Inadequate control of disinfection (if practiced or if purchasing chlorinated water)
   d) Inadequate clarification capabilities (if clarification practiced)
   e) Inadequate control of clarification (if clarification practiced)
   f) Inadequate pressure (< 20 psi) in some or all areas of the distribution system

Bacteriological Surveillance Program Criteria

The bacteriological surveillance program over the water supply system was judged either:

1. To meet the following criteria or,
2. Not to meet one or both of the following,
   a) Collection of the required number* of bacteriological samples for no less than 11 months during the previous 12 months of record.

*See pages 3-6 of the Drinking Water Standards.

b) Passing the bacteriological standard* for no less than 11 months during the previous 12 months of record.

*See pages 3-6 of the Drinking Water Standards.

METHODS

Field Survey

The regional office staff, in cooperation with the state and local health department officials prepared a listing of all known water supplies meeting the definition adopted for this study. The list contained the supply name, address, name of the superintendent or person in charge, indication of size and the telephone number. The list was cross-checked with community and subdivision names to eliminate duplication and establish those areas for which the water supply facilities were apparently unknown. A Form PHS-682, Report of Water Supply Used on Interstate Carriers, was prepared for each supply from state and local health department records. The completed list became the basis for work schedules for the field engineers.

Actual field surveys were made by one of the 20 PHS engineers from headquarters and the regional offices that made up the field staff. At the option of state and local health department staff members, they made surveys with the PHS engineers. The staff of the field office made appointments by telephone, for the surveys, one to seven days in advance.

During the field survey, the engineer completed Forms ECA-18, Inventory of Municipal Water Facilities, and ECA-19 Municipal Water Supply Sanitary Survey, to provide information on source; treatment; operation; laboratory control; personnel; distribution; surveillance practices; planning for improvements; and water rates. Examples of the standard forms are in Appendix C.

Sampling Program

The following samples were collected and dispatched to various Bureau of Water Hygiene laboratories:

1. Raw Water

   One sample for bacteriological analysis.

2. Finished water ready for distribution

   Four or 5 samples for chemical analyses as follows:

   a) 2 1/2 gallon sample to the Northeast Water Hygiene Laboratory. This was a grab sample for most ground water and small surface water treatment plants, but where possible a 14-day composite was taken. The following analyses were made on this sample:

Arsenic	Cyanide	Sulfate
Boron	MBAS	TDS
Chloride	Nitrate	Turbidity
Color	Selenium	

   b) 8-oz. aliquot sample for trace metals analysis was taken out of sample 2)a) above and sent to the Cincinnati Laboratory. The following analyses were made on this sample:

Barium	Copper	Manganese
Cadmium	Fluoride	Nickel
Chromium	Iron	Silver
Cobalt	Lead	Specific Conductance
		Zinc

c) 1-gallon sample for radioactivity analyses was sent to one of the three Bureau of Radiological Health laboratories. It was collected in the same manner as sample 2)a) above. The following analyses were made on this sample:

Specific gamma emitting radionuclides (^{131}I, ^{137}Cs, ^{140}Ba)

Gross Alpha

Gross Beta

Radium-226, if gross alpha exceeded 3 pc/l

Strontium-90, if gross beta exceeded 10 pc/l

Tritium - (run on 10% of samples)

d) 1-gallon sample for pesticide analysis to the Gulf Coast Water Hygiene Laboratory from surface water supplies plus those ground water supplies where sampling was specifically requested by the state or county health officials. It was collected in the same manner as sample 2)a) above. The following analyses were made on this sample:

Aldrin	Dieldrin	Heptachlor Epoxide
Chlordane	Endrin	Lindane
DDT	Heptachlor	Methoxychlor
		Toxaphene

e) 1 activated carbon monitor sample to the Cincinnati Laboratory from 110 selected water supplies, 94 of which were from surface sources. Carbon chloroform extract (CCE) and carbon alcohol extract (CAE) concentrations were determined from this monitor.

3. Distribution System

Samples for bacteriological and trace metal analyses at the rate of 10 percent of the number required by Figure 1, of the DWS, with a minimum of 2 each from any water supply.

Laboratory Procedures

Bacteriological

All samples were collected in 8-oz. sterile, plastic, wide-mouth, screw-capped bottles which contained 0.2 ml of a 10% solution of sodium thiosulfate as a dechlorinating agent. This concentration of thiosulfate was sufficient to neutralize a sample containing about 15 mg/l residual chlorine, an amount above any residual that was present. Refrigeration of all samples was required during transporation back to the laboratory. Maximum time between collection and analysis did not exceed 30 hours. The bacteriological procedures were those of Standard Methods.*

*Standard Methods for the Examination of Water and Wastewater, 12th Ed., APHA, AWWA, and WPCF. American Public Health Assoc. New York, N.Y., 1965. 796 pp.

The membrane filter (MF) procedure was used for total coliform detection in this study for three reasons. One, larger volumes (100-ml portions) of distributed water could be examined than with the MPN technique; two, the MF procedure yields more precise results; and three, less processing time would be involved per sample, so reexamination of many of the samples could have been made within the 30-hour time limit if required. All potable and source water samples were examined for total coliforms using M-Endo MF broth, incubated at 35°C for 20-24 hours. Because raw water quality varied with its source, three decimal sample portions were filtered, the volume being determined by the estimated water quality.

Any coliform colonies detected in the examination of a sample were further verified by transfer to phenol red lactose for 24- and 48-hour periods at 35°C incubation. All positive phenol red lactose broth tubes then were confirmed in brilliant green lactose at 35°C for verification of total coliforms and in EC medium at 44.5°C for detection of fecal coliforms. This procedure further confirmed the standard total coliform MF test and supplied additional information on the potentially hazardous occurrence of fecal coliform in those potable water supplies.

Basic knowledge was also needed on the general bacterial population of potable water. Therefore, the general population of bacterial count (plate count) was also made on all distribution system samples.

Sample portions of 1 ml and 0.1 ml in plate count agar (Tryptone-Glucose-Yeast Agar), incubated 48 hours at 35°C were sufficient to yield the desired data.

Chemical

The five samples, as noted above, taken to determine the chemical quality of the finished and/or distributed water were analyzed as follows:

Sample 2)a), General Chemistry.

These constituents were generally determined by Standard Methods, except as listed below.

Barium

No standard method existed at the time this study was undertaken. An atomic absorption procedure, which will appear in the next edition of Standard Methods, was used and was found acceptable. The analysis was made only on those samples that had less than 2 mg/l of sulfate because above that concentration the barium precipitates out of solution.

Chloride

A variation of the potentiometric titration procedure was used, which is a tentative method in Standard Methods, page 372. Rather than titrate with silver nitrate to a specified end-point in millivolts, using a glass electrode and a silver-silver chloride electrode, a standard curve was prepared that related millivolts to chloride concentration. The concentration

of an unknown is then determined from the standard curve. The procedure was just as accurate as the tiltration method and was simpler to carry out.

Fluoride

A fluoride electrode method, which will appear in the next edition of Standard Methods, was used. Precision and accuracy was generally better than any other method and the method was simpler to carry out.

Sample 2)b), Trace Metals.

The atomic absorption spectrophotometer method was used for all heavy metals (cadmium, chromium, chromium, copper, iron, lead, manganese, silver, zinc, nickel, and cobalt) because its sensitivity, specificity, simplicity and speed of analysis far exceeded the usual wet chemical methods. An atomic absorption method for these metals will appear in the next edition of Standard Methods.

Sample 2)c), Radioactivity.

These radiological constituents were determined using standard radiological counting techniques.

Sample 2)d), Pesticides.

No standard procedure for pesticide determinations existed at the time the CWSS was undertaken. Gas chromatography is generally the accepted method of analysis and will appear in the next edition of Standard Methods. Therefore, this technique was used.

Sample 2)e), Organics (CCE and CAE).

These organic constituents were determined using standard extraction techniques.

RESULTS

The first step in evaluating the water supply facilities was to locate and inventory each system. These data were recorded on Form ECA-18 as shown in Appendix B and included the type of water source, safe maximum yield, type of treatment, rated capacities, etc. Next, a questionnaire (Form ECA-19) was completed for each water system. Information was obtained from water works personnel, management, health officials and direct observation by the survey engineers. Historical information was checked with State Board of Health files. A brief description of each of the twenty-two water systems surveyed and the defects and/or deviations from PHS Drinking Water Standards that were observed are presented in Appendix A. These data are summarized in the following tables.

Water Supply Sources

Of the twenty-two water supplies studied, eighteen use wells for their water supply source, one (Charleston) uses the Edisto River, and three purchase finished water from Charleston (See Table III, page 29). The water quality of nine of these sources was rated as "Good" - based on the analysis of samples collected during the survey meeting USPHS Drinking Water Standards. Refer to Tables VIII, IX, and X, pages 39,41,43) and Appendix B for more information about the water quality findings. Five sources were rated "Fair" (failing to meet PHS recommended drinking water standards) and eight were rated "Unsatisfactory" (failing to meet PHS mandatory drinking water standards). The quantity (maximum dependable yield) available was judged

TABLE III

WATER SOURCES

CHARLESTON, SOUTH CAROLINA SMSA

WATER SYSTEM	TYPE SOURCE	WATER QUALITY 1/	QUANTITY	SOURCE PROTECTION
(Special Supplies)				
Elm Village	2-Wells	Unsatisfactory	Adequate	Inadequate
Ft. Johnson	5-Wells	Fair[a]	Adequate	Inadequate
(Pop. < 1,000)				
Ashcroft Hall	Charleston	Good	Adequate	Adequate
Berkeley C. Club	2-Wells	Fair	Adequate	Adequate
Caromi Village	1-Well	Unsatisfactory	Inadequate	Inadequate
College Park	1-Well	Unsatisfactory	Adequate	Adequate
Dunmovin	4-Wells	Fair	Adequate	Adequate
Edisto Beach W. Co.	1-Well	Unsatisfactory	Adequate	Adequate
Land-o-Pines	1-Well	Good	Adequate	Adequate
Orleans Woods	Charleston	Good	Adequate	Adequate
Parish Place	6-Wells	Good	Adequate	Adequate
Pinopolis	3-Wells	Good	Adequate	Adequate
W. C. of Edisto B.	1-Well	Unsatisfactory	Adequate	Adequate
Wheeler W. Co.	1-Well	Unsatisfactory	Adequate	Adequate
(Pop. 1,000 to 5,000)				
Folly Beach	Charleston	Good	Adequate	Adequate
Isle of Palms	100-Wells	Good[a]	Inadequate	Adequate
Moncks Corner	7-Wells	Good	Adequate	Adequate
St. Stephen	1-Well	Fair	Adequate	Inadequate
Sullivan's Island	32-Wells	Unsatisfactory	Adequate	Adequate
(Pop. 5,001 to 10,000)				
Goose Creek	7-Wells	Unsatisfactory	Inadequate	Inadequate
Mt. Pleasant	26-Wells	Fair[a]	Inadequate	Adequate
(Pop. > 10,000				
Charleston	Edisto River	Good	Adequate	Adequate

1/ Water Quality rated as follows:

Good - Meets USPHS Drinking Water Standards

Fair - Exceeds at least one recommended drinking water standard

Unsatisfactory- Exceeds at least one mandatory drinking water standard

[a]Rating qualified because at least one sample contained a constituent which exceeded standard.

to be inadequate to meet the needs of four systems. Inadequate source protection (primarily surface water drainage problems around well heads) was observed in five water systems.

Water Treatment

As shown in Table IV, page 31, twelve of the water systems provide no treatment; four provide chlorination only; one provides chlorination and corrosion control; one provides aeration, pressure sand filtration, and chlorination; and one - Charleston's surface supply - provides conventional treatment (coagulation, settling, rapid sand filtration and chlorination). Ten of the systems were judged to have inadequate treatment - primarily because of poor bacteriological histories (See Table VIII, page 39) or because average fluoride concentrations exceed mandatory Drinking Water Standards.

Water Distribution

Eleven water systems meter all water sales, one meters commercial sales only and ten have no metering (See Table V, page 32). Seven systems were judged to have inadequate (less than one day) water storage. The Charleston system relies on open (uncovered) clear wells for storage of finished water, however, the amount of storage provided was deemed adequate. Chronic low pressure situations were reported in Caromi Village, Goose Creek, and some parts of the Charleston systems. Zero chlorine residuals were observed in all but one of the systems practicing chlorination.

TABLE IV

WATER TREATMENT

CHARLESTON, SOUTH CAROLINA SMSA

WATER SYSTEM	WATER SOURCE	TREATMENT		
		TYPE	ADEQUATE	REMARKS/NEEDS
(Special Supplies)				
Elm Village	Ground	None	No	F-removal
Ft. Johnson	Ground	None	Yes	Mn-removal
(Pop. < 1,000)				
Ashcroft Hall	Charleston	--	Yes	Booster Cl_2
Berkeley C. Club	Ground	Cl_2	Yes	Continuous Cl_2
Caromi Village	Ground	None	No	F-removal & Cl_2
College Park	Ground	None	No	F-removal & Cl_2
Dunmovin	Ground	Cl_2 & Calgon	Yes	Fe-removal
Edisto Beach W. Co.	Ground	None	No	F & Fe-removal
Land-o-Pines	Ground	None	Yes	--
Orleans Woods	Charleston	--	Yes	Booster Cl_2
Parish Place	Ground	None	Yes	--
Pinopolis	Ground	None	Yes	--
W. C. of Edisto B.	Ground	None	No	F-removal & Cl_2
Wheeler W. Co.	Ground	None	No	F-removal
(Pop. 1,000 to 5,000)				
Folly Beach	Charleston	--	Yes	Booster Cl_2
Isle of Palms	Ground	Cl_2	Yes	--
Moncks Corner	Ground	None	No	Cl_2
St. Stephen	Ground	None	No	Cl_2
Sullivan's Island	Ground	Cl_2	No	F-removal
(Pop. 5,001 to 10,000)				
Goose Creek	Ground	Partial Cl_2	No	F-removal & Cl_2
Mt. Pleasant	Ground	/a	Yes	--
(Pop. > 10,000)				
Charleston	Surface	/b	Yes	Booster Cl_2

/a - Aeration, pressure sand filtration and chlorination
/b - Coagulation, sedimentation, filtration, chlorination

TABLE V

WATER DISTRIBUTION

CHARLESTON, SOUTH CAROLINA SMSA

WATER SYSTEM	METERED	STORAGE	PRESSURE	Cl_2 RESIDUAL
(Special Supplies)				
Elm Village	No	Adequate	Adequate	--
Ft. Johnson	No	Adequate	Adequate	--
(Pop. < 1,000)				
Ashcroft Hall	No	--	--	None
Berkeley C. Club	No	Inadequate	Adequate	None
Caromi Village	No	Inadequate	Inadequate	--
College Park	No	Inadequate	Adequate	--
Dunmovin	Yes	Adequate	Adequate	None
Edisto Beach W. Co.	No	Adequate	Adequate	--
Land-o-Pines	No	Inadequate	Adequate	--
Orleans Woods	Yes	--	--	Low
Parish Place	Yes	Adequate	Adequate	--
Pinopolis	No	Adequate	Adequate	--
W. C. of Edisto B.	Yes	Adequate	Adequate	--
Wheeler W. Co.	No	Adequate	Adequate	--
(Pop. 1,000 to 5,000)				
Folly Beach	Yes	Adequate	Adequate	None
Isle of Palms	Yes	Adequate	Adequate	None
Moncks Corner	Yes	Inadequate	Adequate	--
St. Stephen	Yes	Inadequate	Adequate	--
Sullivan's Island	Yes	Adequate	Adequate	Low
(Pop. 5,001 to 10,000)				
Goose Creek	Part.	Inadequate	Inadequate	Low
Mt. Pleasant	Yes	Adequate	Adequate	Yes
(Pop. > 10,000)				
Charleston	Yes	Adequate	Low in some areas	Low

Water System Operation

The State of South Carolina has a mandatory water treatment plant operator certification law. In essence, a State Board of Certification examines and certifies all water treatment plant operators according to their qualifications. Operators are certified by grade from "D" (lowest) to "A" (highest). The State Board also classifies all public water treatment plants according to the source, complexity and knowledge required to operate them. Certified operators are not required for systems providing no treatment - chlorination of ground water supplies is considered treatment under the Board's regulations.

Twelve of the systems surveyed have no treatment and, consequently, are not required to have a certified operator. However, two of these systems are under the supervision of a certified operator. In all, twelve of the water systems are under the direct or general supervision of a certified water treatment plant operator. Sixteen operators indicated that they received their training on the job. Five operators reported attending the State sponsored water works operator's short course. Only eight systems had a full time water treatment plant operator. Other water works personnel worked part-time in water supply operations - some supervising several small systems, each on a part-time basis.

Only seven systems had what could be considered adequate water works records. Some were observed to have accumulated a number

TABLE VI

WATER SYSTEM OPERATION

CHARLESTON, SOUTH CAROLINA SMSA

WATER SYSTEM	OPERATOR			ADEQUATE RECORDS	X-CONNECTION PROGRAM
	CERTIFIED	TRAINING	FULL-TIME		
(Special Supplies)					
Elm Village	No	Job	No	No	No
Ft. Johnson	No	Job	No	No	No
(Pop. < 1,000)					
Ashcroft Hall	No	--	--	No	No
Berkeley C. Club	No	Job	No	No	No
Caromi Village	Yes	Job	No	No	No
College Park	Yes	Job	No	No	No
Dunmovin	Yes	S. Sch.	No	No	No
Edisto Beach W. Co.	No	Job	No	Yes	No
Land-o-Pines	Yes	Job	No	No	No
Orleans Woods	Yes	Job	No	No	No
Parish Place	Yes	Job	Yes	No	No
Pinopolis	No	Job	Yes	Yes	Yes
W. C. of Edisto B.	No	Job	No	No	No
Wheeler W. Co.	No	Job	No	No	No
(Pop. 1,000 to 5,000)					
Folly Beach	Yes	S. Sch.	Yes	No	No
Isle of Palms	Yes	S. Sch.	Yes	Yes	Yes
Moncks Corner	No	Job	No	Yes	No
St. Stephen	Yes	Job	Yes	No	No
Sullivan's Island	Yes	S. Sch.	Yes	Yes	No
(Pop. 5,001 to 10,000)					
Goose Creek	Yes	Job	No	No	No
Mt. Pleasant	Yes	Job	Yes	Yes	No
(Pop. > 10,000)					
Charleston	Yes	S. Sch.	Yes	Yes	Yes

of unopened bacteriological reports from the State Board of Health Laboratory.

Nineteen systems were judged to have inadequate cross-connection control programs. A one day evaluation of the Charleston City system's cross-connection control program was performed in conjunction with a national study of cross-connection control programs. Results of this evaluation including an actual cross-connection survey of three hazardous facilities indicated that increased emphasis is required in this aspect of water supply. Charleston water supply officials are aware of the need for cross-connection control as a result of previous PHS-State investigations. However, a satisfactory program has not been developed. Additional qualified personnel and closer cooperation between water works personnel and city plumbing officials are necessary for the promotion of a satisfactory program.

Water System Surveillance

The Water Supply Division of the Bureau of Sanitary Engineering, South Carolina State Board of Health is responsible for administering the State's Water Supply Program. The State regulations - Rules and Regulations for Water Works and Maintenance Standards and Policies for Water Works - parallel Public Health Service bacteriological standards and require that finished water meet the chemical quality standards as set forth in the PHS Drinking Water Standards.

A staff of eight sanitary engineers and other professionals review and approve new water supplies, carry on bacteriological and chemical surveillance, provide technical assistance, evaluate water systems, work toward the elimination of plumbing hazards and improvement of existing systems, certify local water laboratories, and promote training of water works personnel. Local county health department sanitarians assist in this work by maintaining close contact with the supplies on a day-to-day basis. Limited bacteriological analysis - for example checking of complaints and new water mains - is provided by some county health departments. The Water Supply Program involves approximately 2,100 public and semi-public water supply systems which serve about 63 per cent of the State's population. The program has provided only partial chemical, incomplete bacteriological and limited operational surveillance, primarily because of the lack of personnel. Recruitment and retention of qualified professional personnel has been hindered because of low salaries and poor advancement prospects. It has been estimated that at least 15 additional full time professional people are needed to implement an aggressive water supply program for the State of South Carolina.

Table VII, page 37, shows that sixteen of the water systems have been under routine bacteriological surveillance. Bacteriological samples were examined from some of the other systems but they were not sufficient to be considered routine. Also, additional bacteriological samples may have been examined by county health department

TABLE VII

WATER SYSTEM SURVEILLANCE

CHARLESTON, SOUTH CAROLINA SMSA

WATER SYSTEM	BACTERIOLOGICAL ANAL. ROUTINE	LAB(S)	CERT.	YEARS SINCE LAST SBH SURVEY	CHEMICAL ANAL.
(Special Supplies)					
Elm Village	Yes	SBH	Yes	?	<1
Ft. Johnson	No	---	---	<1	?
(Pop. < 1,000)					
Ashcroft Hall	No[1]	---	---	?	?
Berkeley C. Club	Yes	SBH	Yes	<1	<1
Caromi Village	Yes	SBH	Yes	<1	?
College Park	Yes	SBH	Yes	<1	?
Dunmovin	Yes	SBH	Yes	4	<1
Edisto Beach W. Co.	Yes	SBH	Yes	3	<1
Land-o-Pines	Yes	SBH	Yes	?	<1
Orleans Woods	No[1]	---	---	?	?
Parish Place	No	---	---	1	?
Pinopolis	Yes	SBH	Yes	<1	<1
W. C. of Edisto B.	Yes	SBH	Yes	1	<1
Wheeler W. Co.	No	SBH	Yes	3	<1
(Pop. 1,000 to 5,000)					
Folly Beach	No[1]	---	---	?	?
Isle of Palms	Yes	SBH	Yes	<1	<1
Moncks Corner	Yes	SBH	Yes	<1	<1
St. Stephen	Yes	SBH	Yes	<1	<1
Sullivan's Island	Yes	SBH	Yes	<1	<1
(Pop. 5,001 to 10,000)					
Goose Creek	Yes	SBH	Yes	<1	<1
Mt. Pleasant	Yes	SBH	Yes	<1	?
(Pop. > 10,000)					
Charleston	Yes	SBH-WTP	Yes	<1	<1[2]

SBH - State Board of Health Laboratory
CHD - County Health Department Laboratory
WTP - Water Treatment Plant Laboratory

[1] Purchases finished water - no laboratory control within Distribution System
[2] Daily at WTP

officials in connection with complaints or main extensions. All analyses were performed by certified laboratories.

Fourteen of the systems had been inspected by the State Board of Health personnel during the previous year. It had been three years since the last State inspection of two systems and four years for another. There were no records in State files for five of the systems (three of these purchase and distribute finished water) indicating that some may not have had a recent sanitary survey. It has been pointed out that some of the systems may have been visited more recent but these visits were not considered to be a sanitary survey. Also, as discussed above, the local county health officials work with the communities on an informal day-to-day basis. Chemical analyses had been performed on fourteen systems during the preceding year. There was no record of chemical analyses for five of the systems in State files. As noted elsewhere, three systems purchase finished water.

Water Quality Evaluation

Seven of the water systems routinely sampled by the State Board of Health prior to the study had bacteriological histories exceeding the Drinking Water Standards (See Table VIII, page 39). One supply exceeded the Standards five times during ten months of record. Twelve systems had one or more months without bacteriological sampling. None of the systems had a sufficient number of samples for each of the twelve months to fully satisfy the Standards. The availability of

TABLE VIII

BACTERIOLOGICAL QUALITY

CHARLESTON, SOUTH CAROLINA SMSA WATER SYSTEMS

MAY 1969

COMMUNITY WATER SYSTEM	NUMBER OF BACT. SAMPLES			Months With No Samples	Times St'ds Exceeded	CHLORINATION	
	Required /1	Examined				Available	Observed Residual mg/l
		Ave. /2	Range/Month				
(Trailer Cts. & Insts.)							
Elm Village	2	1	1 to 1	0	0	No	---
Ft. Johnson	2	1	0 to 8	11	0	No	---
(Pop. < 1,000)							
Ashcroft Hall	2	0	---	12	-	Yes	0.0
Berkeley C. Club	2	1	1 to 5	0	0	Partial	0.0
Caromi Village	2	1	0 to 4	3	5	No	---
College Park	2	1	0 to 2	1	3	No	---
Dunmovin	2	1	1 to 1	0	0	Yes	0.0
Edisto Beach W. Co.	2	1	0 to 3	1	0	No	---
Land-o-Pines	2	1	1 to 1	0	0	No	---
Orleans Woods	2	0	---	12	-	Yes	0.0 to 0.2
Parish Place	2	0	---	12	-	No	---
Pinopolis	2	1	1 to 1	0	0	No	---
W. C. of Edisto B.	2	1	1 to 3	0	2	No	---
Wheeler W. Co.	2	< 1	0 to 2	4	0	No	---
(Pop. 1,000 to 5,000)							
Folly Beach	2	< 1	0 to 1	10	0	Yes	0.0
Isle of Palms	5	1	0 to 2	1	1	Yes	0.0
Moncks Corner	5	5	1 to 14	0	2	No	---
St. Stephen	2	5	1 to 16	0	4	No	---
Sullivan's Is.	2	< 2	0 to 9	1	0	Yes	0.0 to 0.4
(Pop. 5,001 to 10,000)							
Goose Creek	8	5	1 to 25	0	0	Partial	0.0 to 2.2
Mt. Pleasant	8	1	0 to 1	1	0	Yes	0.3 to 0.4
(Pop. > 10,000)							
Charleston	160	61	1 to 196	0	2	Yes	0.0 to 0.5

/1 - Minimum number of samples required to meet Drinking Water Standards

/2 - Average number of samples examined per month during the 12 month period preceding the study

disinfection by chlorination and the range of chlorine residuals observed during the survey are also shown in Table VIII. Five of the systems having a history of poor bacteriological quality have no chlorination, making them especially vulnerable to contamination.

The importance of routine bacteriological sampling is apparent from a comparison of the twelve month record as shown in Table VIII and the survey sample results tabulated in Appendix B. Only one distribution system sample collected during the survey was found to be positive for coliform organisms. This sample was collected from the Water Company of Edisto Beach system.

As described earlier, chemical, physical and radiological samples were collected from each system. These data are tabulated in Appendix B in the form of a computer print out. These concentrations exceeding recommended Drinking Water Standards are indicated by "*" and those exceeding mandatory standards are indicated by "**". Table IX, page 41, shows a tabulation of the maximum concentrations observed in each water system.

Nine of the water systems had fluoride concentrations which exceed the mandatory limits of the Drinking Water Standards. Three others had samples which exceeded the recommended limit for fluoride. Only one system (Moncks Corner) had the optimum concentration considered necessary for proper dental health.

TABLE IX

MAXIMUM CHEMICAL, PHYSICAL AND RADIOLOGICAL CONCENTRATIONS OBSERVED

	Trailer Cts. & Inst's		Population < 1,000												Pop. 1,000 to 5,000					Pop. 5,001 to 10,000		Pop. > 10,000
	Elm Village	Ft. Johnson	Ashcroft Hall	Berkeley C. Club	Caromi Village	College Park	Dunmovin	Edisto Beach W.C.	Land-o-Pines	Orleans Woods	Parish Place	Pinopolis	N.C. of Edisto B.	Wheeler W. Co.	Folly Beach	Isle of Palms	Moncks Corner	St. Stephen	Sullivan's Is.	Goose Creek	Mt. Pleasant	Charleston
pH	8.5	6.9	8.8	8.2	8.6	8.5	7.4	8.2	7.9	8.6	7.0	7.4	8.3	8.1	-	7.9	7.9	8.6	8.6	8.6	8.1	9.0
Cadmium	0.002	0.002	0.000	0.000	0.000	0.001	0.001	0.040	0.001	0.000	0.000	0.002	0.002	0.007	0.002	0.002	0.000	0.002	0.002	0.002	0.000	0.002
Chromium	0.000	0.060	0.000	0.000	0.000	0.045	0.000	0.021	0.042	0.000	0.000	0.038	0.000	0.000	0.025	0.000	0.000	0.039	0.000	0.046	0.000	0.029
Copper	0.004	0.041	0.061	0.042	1.453	0.126	0.027	0.043	0.006	0.055	0.066	0.006	0.037	0.012	0.373	0.030	0.011	0.015	0.025	1.348	0.149	0.326
Iron	0.006	0.138	0.033	0.081	0.006	0.014	0.921	0.499	0.428	0.058	0.458	0.104	0.037	0.025	0.478	0.090	0.158	0.039	0.020	0.010	0.041	0.137
Lead	0.014	0.021	0.013	0.007	0.024	0.000	0.022	0.000	0.000	0.000	0.030	0.023	0.015	0.034	0.047	0.023	0.000	0.031	0.000	0.015	0.023	0.029
Manganese	0.002	0.068	0.002	0.002	0.003	0.003	0.042	0.011	0.005	0.001	0.058	0.004	0.000	0.006	0.063	0.050	0.002	0.008	0.006	0.000	0.006	0.013
Silver	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.003	0.003	0.003	0.002	0.005	0.000	0.000	0.003	0.000	0.007	0.019	0.000	0.002
Zinc	0.004	5.763	0.009	0.017	0.007	0.014	0.042	0.024	0.085	0.016	0.049	0.443	0.022	0.062	0.125	0.455	0.046	0.198	0.019	0.010	0.907	0.044
Cobalt	0.003	0.006	0.000	0.003	0.002	0.002	0.005	0.003	0.000	0.001	0.005	0.004	0.001	0.003	0.005	0.010	0.000	0.003	0.005	0.006	0.001	0.006
Nickel	0.002	0.005	0.004	0.000	0.003	0.003	0.003	0.008	0.003	0.004	0.003	0.005	0.005	0.008	0.011	0.010	0.002	0.004	0.008	0.003	0.000	0.005
Sp. Cond.	535	165	150	690	1150	1050	420	4300	730	140	360	515	2272	5100	149	1772	500	556	2050	1313	2500	150
Fluoride	2.00	0.13	0.10	1.50	3.10	2.65	0.29	3.00	0.64	0.10	0.17	0.64	3.70	3.00	0.12	0.62	0.93	1.45	4.40	3.70	1.71	L 0.2
Arsenic		0.000		0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000		10.03	0.000	0.000	0.000	0.000	0.000	0.000
Boron		L 0.1		0.441	0.854	0.727	L 0.1	2.485	0.125		L 0.1	L 0.1	1.846	2.620		0.220	L 0.1	1.12	3.278	0.804	0.830	0.000
Chloride		44.0		29.4	131.0	100.0	48.0	1950.	80.5		30.0	35.9	662.0	820.0		225.0	55.0	12.5	365.0	101.0	430.0	5.5
Cyanide		0.000		0.000	0.003	0.001	0.002	0.000	0.003		0.000	0.000	0.000	0.000		0.000	0.000	0.001	0.000	0.002	0.002	0.000
MBAS		0.032		0.085	0.055	0.038	0.060	0.059	0.039		0.145	0.038	0.038	0.070		0.072	0.023	0.040	0.080	0.052	0.107	0.105
Nitrate		0.3		1.6	0.4	0.4	0.4	0.4	L 0.1		0.2	0.0	0.2	0.4		6.2	1.0	0.2	3.4	0.4	1.0	L 0.1
Selenium		0.002		0.004	0.003	0.002	0.002	0.002	0.005		0.002	0.003	0.005	0.003		0.006	0.002	0.004	0.004	0.003	0.004	0.008
Sulfate		5.5		3.0	42.5	36.0	51.0	80.0	1.3		23.0	0.0	45.0	106.0		35.0	2.0	L 1.0	6.5	40.0	58.0	23.0
TDS		116.5		499.0	674.0	636.5	274.0	2381.	420.0		234.0	294.0	289.0	2758.		496.5	256.5	365.5	1191.	643.5	830.5	67.0
Color[1]		L 5.		L 5.	L 5.	8.	L 5.	L 5.	L 5.		L 5.	L 5.	L 5.	L 5.		8.	L 5.	8.	8.	L 5.	L 5.	L 5.
Turb.[2]		0.42		5.15	0.19	0.35	6.25	16.5	4.25		1.20	0.32	0.20	0.51		0.29	0.11	0.25	0.18	0.13	0.54	0.90
Alpha[2]																						
Beta[2]	2	1		15	12	11	3	27	11		5	5	14	28		5	14	5		11	40	2
R-226[2]				L 0.1	L 0.1	L 0.1	L 0.1		L 0.1					L 0.1								

All results in mg/l unless otherwise noted. [1] s.u. [2] pci/l L less than 1.453 Exceeds recommended limits 0.060 Exceeds mandatory limits

One sample collected from the Ft. Johnson system showed a concentration of chromium in excess of mandatory drinking water limits. Samples from Caromi Village and Goose Creek indicated a concentration of copper in excess of recommended limits. Iron in excess of recommended limits was observed in five systems, high manganese in three systems, and zinc in one (Ft. Johnson). Boron was observed to be high in five systems.

Seven water systems were found exceeding the recommended limit for total dissolved solids. One, in Edisto Beach, had a TDS concentration of 2,758 mg/l. Five of the supplies exceeded the recommended limit for chloride. The highest concentration noted was 1,950 mg/l, also at Edisto Beach. Three systems equaled or exceeded the recommended limits for turbidity.

Special samples were composited over a two-week period from the Charleston surface supply for pesticide analysis and organic chemical contamination. The results of these analyses are shown on Table X, page 43. These samples indicate little or no pesticide concentration and low total organic levels.

The only water systems fully meeting recommended drinking water chemical standards were Charleston, the Ashcroft Hall and Orleans Woods systems supplied by Charleston, Moncks Corner, and Pinopolis. All things considered, the City of Charleston's water appears to have the best overall chemical quality. However, even it does not contain optimum fluoride concentration.

TABLE X

SPECIAL ORGANIC AND PESTICIDE ANALYSES

CHARLESTON MUNICIPAL WATER SYSTEM

Water Supply Source - Edisto River

Sample Location - Municipal Water Treatment Plant

Type of Water Sampled - Finished

Method of Sampling - Composited from March 4, 1969 to March 18, 1969

RESULTS BY PESTICIDE ANALYSES

Lindane	Not Detected
Aldrin	Not Detected
Dieldrin	Not Detected
Endrin	Not Detected
Toxaphene	Not Detected
DDT	Less than 0.10 ppb
Chlordane	Not Detected
Heptachlor	Not Detected
Heptachlor Epoxide	Not Detected
Methoxychlor	Not Detected

RESULTS BY CARBON ADSORPTION METHOD

Chloroform Extractables	123 ppb
Alcohol Extractables	151 ppb

Summary of Deficiencies

Table XI, page 45, shows a summary of all water supply deficiencies and defects noted during the study.

DISCUSSION

Water Supply Practice

Based on existing records it was initially estimated that there were six (6) Community Water Systems in the Charleston, South Carolina SMSA. This was later revised to ten (10). Eventually, twenty (20) community and two (2) special water systems were identified and surveyed in the Charleston area. These water supplies serve a total of approximately 251,000 people - about 85 per cent of the population residing in the statistical area. The Charleston municipal system serves about 75 per cent of the area's population. Not much is known about the 15 per cent unaccounted for, however, it is assumed that they are served with individual water systems or by systems having less than 15 services and/or people. Some few households may not have water on premises but their number is thought to be very small. Less than 150 square miles - about 7 per cent - of the 2,045 square miles two county area are served by community water systems.

All systems except Charleston utilize ground water as their water supply source. Charleston uses the Edisto River as its primary water source. Average daily water use in the area exceeds 28 million gallons of which only about 3 million gallons are obtained from ground water resources. Per capita water use varies widely (40 - 220 gpcd) depending upon the system and the cost of water. Eight

TABLE XI

SUMMARY OF DEVIATIONS FROM PHS DRINKING WATER STANDARDS
CHARLESTON, SOUTH CAROLINA SMSA WATER SYSTEMS
MAY 1969

COMMUNITY WATER SYSTEM	SOURCE AND PROTECTION										FINISHED WATER QUALITY								
	Sec. 2.1			Sec. 2.2		Sec. 2.3					Sec. 3		Sec. 4		Sec. 5			Sec. 6	
											Bact.		Phy.		Chemical			Rad.	
	Source	Protection	Treatment	Surveys	Response	Plumb. Code	X-Conn. Pro.	Cert. Oper.	Capacities	Records	Sampling	Limits	Sampling	Limits	Sampling	Limits *	Limits **	Sampling	Limits
(Trailer Cts. & Ints.)																			
Elm Village	X	X	-	X	-	X	X	X	-	X	X	-	-	-	X	-	X	-	-
Ft. Johnson	X	X	-	-	-	-	X	X	-	X	X	-	-	-	X	X	-	-	-
(Pop. < 1,000)																			
Ashcroft Hall	-	-	-	X	-	-	X	X	-	X	X	-	-	-	-	-	-	-	-
Berkeley C. Club	-	-	-	-	-	X	X	X	X	X	X	-	-	-	X	X	-	-	-
Caromi Village	X	-	X	-	-	X	X	-	X	X	X	X	-	-	X	X	X	-	-
College Park	X	-	X	-	-	X	X	-	X	X	X	X	-	-	X	X	X	-	-
Dunmovin	-	-	-	X	-	-	X	-	-	X	X	-	-	X	X	X	-	-	-
Edisto Beach W. Co.	X	-	X	X	-	-	X	X	-	-	X	-	-	X	-	X	X	-	-
Land-o-Pines	-	-	-	X	-	X	X	-	X	X	X	-	-	-	X	-	-	-	-
Orleans Woods	-	-	-	X	-	-	X	-	-	X	X	-	-	-	-	-	-	-	-
Parish Place	-	-	-	-	-	-	X	-	-	X	X	-	-	-	X	-	-	-	-
Pinopolis	-	-	-	-	-	X	-	X	-	-	X	-	-	-	-	-	-	-	-
W. C. of Edisto B.	X	-	X	-	-	-	X	X	-	X	X	X	-	-	-	X	X	-	-
Wheeler W. Co.	X	-	X	X	-	-	X	X	-	X	X	-	-	-	X	X	X	-	-
(Pop. 1,000 to 5,000)																			
Folly Beach	-	-	-	X	-	-	X	-	-	X	X	-	-	-	X	-	-	-	-
Isle of Palms	-	-	-	-	-	-	-	-	-	-	X	X	-	-	X	-	-	-	-
Moncks Corner	-	-	X	-	-	X	X	X	X	-	X	X	-	-	-	-	-	-	-
St. Stephen	-	X	X	-	-	X	X	-	X	X	X	X	-	-	X	X	-	-	-
Sullivan's Is.	X	-	X	-	-	-	X	-	-	-	X	-	-	-	-	X	X	-	-
(Pop. 5,001 to 10,000)																			
Goose Creek	X	-	X	-	X	X	X	-	X	X	X	-	-	-	-	X	X	-	-
Mt. Pleasant	X	-	-	-	-	-	X	-	-	-	X	-	-	-	X	X	-	-	-
(Pop. > 10,000)																			
Charleston	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-

X - Deficiency *Recommended **Mandatory

systems had no records or means of measuring water use. The weighted average per capita water use for the area is 112 gallons per day. Cost varies from a low of $0.00 per 10,000 gallons/month to a high of $11.00. The medium monthly cost per 10,000 gallons is $5.52 - and the weighted average cost is $3.42.

Consumer Acceptance

Brackish water (4), high cost (4), and taste and odor (4) lead the list of the most frequent customer complaint for the Charleston area - (See Table XII, page 47). Other complaints included color (3), low pressures (2), chlorine (1), leaks (1) and sand (1). Table XII indicates that customer complaints were not recorded for a number of systems which failed to meet provisions of Drinking Water Standards for one reason or another. Brackish water complaints were consistent with poor chemical quality; however, cost complaints varied widely. There seemed to be no connection between the cost of water and the adequacy of the systems. This indicates that the mere fact that consumers accept water without complaint does not necessarily mean that the system or water are actually satisfactory. Also, that those paying the highest monthly charge are not necessarily obtaining the highest quality water.

Waterborne Disease

Discussions with local and State Health Authorities failed to turn up any positive information on the incidence of waterborne disease for the Charleston statistical area. A check with Enteric Diseases Section, Epidemiology Program, National Communicable Disease Center, was also negative. While this substantiates the opinion that drinking

TABLE XII

CONSUMER ACCEPTANCE

CHARLESTON, SOUTH CAROLINA SMSA WATER SYSTEMS

MAY 1969

WATER SYSTEM	Most Frequent Customer Complaint	QUALITY /1 Bact.	Chem.	COST ($) /2 10,000 gal/month	Rank
(Trailer Cts. & Insts.)					
Elm Village	None	OK	OK	3.50*	10
Ft. Johnson	Rusty Water	OK	X	No Charge	2
(Pop. < 1,000)					
Ashcroft Hall	None	?	OK	6.15	17
Berkeley C. Club	H_2S Odor	OK	OK	4.75*	11
Caromi Village	Low Press., Taste & Odor	X	X	No Charge	1
College Park	----	X	X	3.00*	5
Dunmovin	None	OK	X	6.00	14
Edisto Beach W. Co.	Brackish W. & Color	OK	X	15/yr.	3
Land-o-Pines	----	OK	X	3.00*	7
Orleans Woods	----	?	OK	6.50	19
Parish Place	None	?	X	6.00	13
Pinopolis	None	OK	OK	3.00*	8
W. C. of Edisto B.	Brackish Water	X	X	7.75	20
Wheeler W. Co.	Brackish Water	OK	X	35/yr.	4
(Pop. 1,000 to 5,000)					
Folly Beach	Cost	OK	X	11.00	22
Isle of Palms	Chlorine	X	OK	6.00	16
Moncks Corner	Cost & Color	X	OK	8.50	21
St. Stephen	Cost	X	OK	6.35	18
Sullivan's Is.	Cost	OK	X	5.52	12
(Pop. 5,001 to 10,000)					
Goose Creek	Leaks, Odor & Sand	OK	X	3.00*	6
Mt. Pleasant	Salt, Taste & Odors	OK	X	6.00	15
(Pop. > 10,000)					
Charleston	Cost & Low Press. in James Is. Area	X	OK	3.08 City 6.15 (Co.)	9

/1 X = Exceeds Drinking Water Standards - ? = No Record

/2 Arbritary selected as an estimated family usage for one month - ranked from 1 (lowest) to 22 (highest)

* Flat rate

water in the area has not caused tragic health problems, it should not be construed as meaning that there has not been any waterborne disease. All indications are that waterborne disease is grossly unreported. Health authorities have little or no time to perform epidemiological investigations and compile follow-up reports. This means that individual or small outbreaks can pass unnoticed to the proper officials.

According to county health officials, waterborne illness has been suspected in a number of isolated instances. These have been primarily associated with small and/or individual water systems. However, investigations never positively identified the cause.

Water Resource Development

Table XIII, page 49, shows the type of planning, the improvements, timing and estimated cost of future development of each community water system in the Charleston area. Comparison of the planned improvements and the deficiencies as noted in Table XI, page 45, indicates that few of the area's water supply needs are recognized. Nine systems report no planning. Six of these systems were found to exceed the recommended and mandatory chemical limits as prescribed in the Drinking Water Standards and were judged to have undesirable sources of supply. Five of those indicating no planning had inadequate treatment. Twelve systems were found to have no means for chlorination (See Table VIII, page 39) and two others only partially chlorinate. Only one of these systems reported plans calling for treatment improvements.

TABLE XIII
WATER RESOURCE DEVELOPMENT
CHARLESTON, SOUTH CAROLINA SMSA

COMMUNITY	PLANNING BY	PLANNED IMPROVEMENTS	WHEN	EST. COST
(Trailer Cts. & Insts.)				
Elm Village	No Planning	---	---	---
Ft. Johnson	No Planning	---	---	---
(Pop. < 1,000)				
Ashcroft Hall	Consultant	Dist. System	1 Yr.	?
Berkeley C. Club	---	Source	5 Yrs.	?
Caromi Village	Utility	Source	2-5 Yrs.	$7,000
College Park	Utility	Source, Treat. & Dist. Sys.	1 Yr.	$35,000
Dunmovin	Consultant	Source & Dist. Sys.	1, 5 & 10 Yrs.	?
Edisto Beach W. Co.	No Planning	---	---	---
Land-o-Pines	No Planning	---	---	---
Orleans Woods	No Planning	---	---	---
Parish Place	- See Mt. Pleasant -			
Pinopolis	Utility	Dist. System	1 Yr.	?
W. C. of Edisto B.	No Planning	---	---	---
Wheeler W. Co.	No Planning	---	---	---
(Pop. 1,000 to 5,000)				
Folly Beach	No Planning	---	---	---
Isle of Palms	---	---	---	---
Moncks Corner	Consultant	Dist. System	1 Yr.	$90,000
St. Stephen	Consultant	Dist. System	1 Yr.	$200,000
Sullivan's Is.	No Planning	---	---	---
(Pop. 5,001 to 10,000)				
Goose Creek	Utility	Source	5 Yrs.	$100,000
Mt. Pleasant	Utility	Source & Dist. Sys.	5 Yrs.	$160,000
(Pop. > 10,000)				
Charleston	(Utility	(Dist. System	(1 Yr.	?
	(Consultant	(Treatment	(10 Yrs.	?

It is difficult to obtain an adequate and satisfactory water supply along the coast. The Edisto Beach, Sullivan's Island, and Mt. Pleasant systems are particularly affected by this poor quality coastal water. The three small independent systems serving the Edisto Beach area give evidence of inadequate water resource development planning. Mt. Pleasant has considered purchase of water from Charleston but found the river crossing too costly and has turned to an additional deep well in hope of solving its water supply problems. Folly Beach abandoned their well supply some time ago and now purchase water from Charleston.

The Charleston system now serves approximately 75 per cent of the population of the statistical area and almost 90 per cent of all those served by community water systems. All things considered - adequacy of supply, degree of treatment, laboratory control, operation certification and level of management - the Charleston municipal water system is perhaps the best system in the area. It is highly desirable that those community systems in close proximity to Charleston strive to utilize it as a water supply source rather than "make-do" with an undesirable source, part-time operation, no laboratory control, etc. Certainly, no additional small suburban systems should be allowed to begin operation in the immediate area unless it can be demonstrated that the source of supply is entirely adequate and satisfactory. One important point was disclosed by the survey in this connection. The City of Charleston's responsibility for the water sold wholesale

to other systems ends at the master meter. Those systems utilizing Charleston as a source of supply should be fully cognizant of their responsibilities for quality control, cross-connection control, and other operational duties.

APPENDIX A

DESCRIPTION OF WATER SYSTEMS SURVEYED

APPENDIX A

DESCRIPTION OF WATER SYSTEMS SURVEYED
CHARLESTON, SOUTH CAROLINA SMSA
MARCH 1969

Special Water Supplies

Elm Village Trailer Court, Berkeley County

The Elm Village Trailer Court water system is owned and operated by the Aqua Corporation. It serves approximately 141 people. The water supply source is two wells. There is no treatment. A generator is available for emergency operation. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the 12 months preceding the study. Samples collected at the time of the surveyed were also negative. The wells and well houses were found to be inadequately unprotected. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 9 below.
2. Inadequate source protection (Section 2.1)
3. Infrequent sanitary surveys (Section 2.2)
4. No plumbing code (Section 2.3a)
5. No cross-connection control program (Section 2.3b)
6. Principal operator not certified
7. No record of laboratory examinations (Section 2.3e)
8. Insufficient bacteriological sampling (Section 3.1)
9. Chemical quality (fluoride 1.95 mg/l) exceeds mandatory limits (Section 5.2)

Fort Johnson Medical College, Charleston County

The Fort Johnson water system is owned and operated by the Medical College of South Carolina. The system serves approximately 25 people. The water supply source is five driven point shallow wells. There is no treatment. The State Board of Health has not had the Fort Johnson system under continuous surveillance. Except for eight samples examined in March 1969, the State Board of Health has no bacteriological record for the system. The samples collected at the time of the survey had no coliform but did have 2,500 and TNTC/ml plate counts. The wells were found to be inadequately protected. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 7 below.
2. Inadequate source protection (Section 2.1)
3. No cross-connection control program (Section 2.3b)
4. Principal operator not certified
5. No record of bacteriological examinations (Section 2.3e)
6. Inadequate bacteriological sampling (Section 3.1)
7. Chemical quality (manganese 0.066 mg/l) exceeds recommended limits. Also, one of two samples exceeded the mandatory chromium and recommended zinc std. (Section 5.2)

Community Water Supply Systems

Population Less Than 1,000

Ashcroft Hall Subdivision - Charleston, Charleston County

This is a small water system owned and operated by the James Island Utilities Company. It serves approximately 85 people. Finished water is purchased from the City of Charleston and distributed to residential customers. Charleston's responsibility for the water ends at the master meter. No pumping, storage or treatment is provided. Chlorine residual was not found in the Ashcroft Hall system at the time of the survey. The State Board of Health has not had the Ashcroft Hall system under surveillance and had no bacteriological record for the system. The supply has been under the surveillance and evaluation of county officials. Bacteriological samples collected during the survey were negative. The following deviations from PHS Drinking Water Standards were observed:

1. Infrequent sanitary surveys (Section 2.2)
2. No cross-connection program (Section 2.3b)
3. Principle operator not certified
4. No record of bacteriological examinations (Section 2.3e)
5. No routine bacteriological sampling (Section 3.1)

Berkeley Country Club, Berkeley County

The Berkeley Country Club water system is privately owned and operated. It serves approximately 260 people. The water supply source is two wells. Chlorination facilities are available but chlorination is practiced only irregularly, primarily to remove H_2S. Auxilary power

is available for emergency operation. The system's bacteriological record is satisfactory except for one bad sample in May 1968, (5 check samples examined as follow-up were satisfactory.) However, only one-half the required number of samples have been collected during the 12 months preceding the study. The samples collected during the survey were negative. The following deviations from PHS Drinking Water Standards were observed:

1. No plumbing code (Section 2.3a)
2. No cross-connection control program (Section 2.3b)
3. Principal operator not certified
4. Inadequate (less than one day) storage capacity (Section 2.3d)
5. No record of bacteriological examinations (Section 2.3e)
6. Insufficient bacteriological sampling (Section 3.1)
7. Chemical quality (fluoride 1.46 mg/l) exceeds recommended limits (Section 5.2). While they do not exceed recommended limits, total dissolved solids (499 mg/l) and turbidity (5.15 S.U.) are high.

Caromi Village, Berkeley County

The Caromi Village water system is owned and operated by the Coastal Water Company. The system is under the general supervision of a certified water treatment plant operator. It serves approximately 140 people. The water supply source is one well. There is no treatment. System pressure is reported to be less than 20 psi most of the time. Poor maintenance and inadequate well site drainage were

observed. The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking Water Standards several times in the 12 months preceding the study. Samples collected at the time of the survey were negative. The following deviations from the Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 9 below.
2. Inadequate water treatment (Section 2.1) - See Item 8 below.
3. No plumbing code (Section 2.3a)
4. No cross-connection control program (Section 2.3b)
5. Inadequate pump and storage capacities (Section 2.3c)
6. No record of laboratory examinations (Section 2.3d)
7. Inadequate bacteriological sampling (Section 3.1)
8. Bacteriological quality exceeds acceptable limits (Section 3.2)
9. Chemical quality (fluoride 3.10 mg/l and total dissolved solids 674.0 mg/l) exceed recommended and mandatory limits. Also, one of three samples exceeded the recommended copper limits (Section 5.2)

College Park Subdivision, Berkeley County

The College Park Subdivision water system is owned by Ladson Utilities Company and is operated by the same management as the Coastal Water Company. The system is under the general supervision of a certified water treatment plant operator. It serves approximately 200 people.

The water supply source is one well. There is no treatment. The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking Water Standards three times in the 12 months preceding the study. Samples collected at the time of the survey were negative. The following deviations from the Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 9 below.
2. Inadequate water treatment (Section 2.1) - See Item 8 below.
3. No plumbing code (Section 2.3a)
4. No cross-connection control program (Section 2.3b)
5. Inadequate (less than one day) storage capacity (Section 2.3d)
6. No record of laboratory examinations (Section 2.3c)
7. Inadequate bacteriological sampling (Section 3.1)
8. Bacteriological quality exceeds acceptable limits (Section 3.2)
9. Chemical quality (fluoride 2.55 mg/l and total dissolved solids 636.5 mg/l) exceed mandatory and recommended limits (Section 5.2)

Dunmovin Subdivision Johns Island, Charleston County

The Dunmovin Subdivision water system is owned and operated by Arthur Ravenal, Jr.. The system is under the general supervision of a certified water treatment plant operator. The water supply source is

four wells. Treatment consists of chlorination and addition of Calgon. However, at the time of the survey no chlorine residual could be detected, even near the point of application. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the three months preceding the study and none prior to that. The samples collected at the time of the survey were also negative. The following deviations from the PHS Drinking Water Standards were observed:

1. Infrequent sanitary surveys (Section 2.2)
2. Inadequate cross-connection control program (Section 2.3b)
3. No record of bacteriological examinations (Section 2.3e)
4. Insufficient bacteriological sampling (Section 3.1)
5. Physical quality (turbidity 6.25 s.u.) exceeds acceptable limits (Section 4.2)
6. Chemical quality (iron 0.921 mg/1) exceeds recommended limits

Edisto Beach Water Company, Charleston County

The Edisto Beach Water Company system is privately owned and operated. The system serves approximately 150 people and is one of three separate water systems in the community of Edisto Beach. The water supply source is one well. There is no treatment. The water is reported to be brackish with high color. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the 12 months preceding the study. The

samples collected at the time of the survey were also negative. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable water supply source-(Section 2.1) See Items 7 and 8 below.
2. Inadequate water treatment (Section 2.1) - See Items 7 and 8 below.
3. Infrequent sanitary surveys (Section 2.2)
4. No cross-connection control program (Section 2.3b)
5. Principal operator not certified
6. Inadequate bacteriological sampling (Section 3.1)
7. Physical quality (turbidity 16.5 s.u.) exceeds acceptable limits (Section 4.2)
8. Chemical quality (fluoride 2.80 mg/1, boron 2.485 mg/1, chloride 1950 mg/1, total dissolved solids 2381.0 mg/1, and iron 0.499 mg/1) exceed recommended and mandatory limits (Section 5.2)

Land-o-Pines Subdivision, Pinopolis, Berkeley County

The Land-o-Pines Subdivision water system is owned and operated by the Coastal Water Company. The system is under the general supervision of a certified water treatment plant operator. It serves about 36 people. The water supply source is one well. There is no treatment. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the

12 months preceding the study. Samples collected at the time of the survey were also negative. The following deviations from PHS Drinking Water Standards were observed:

1. Infrequent sanitary surveys (Section 2.2)
2. No plumbing code (Section 2.3a)
3. No cross-connection control program (Section 2.3b)
4. Inadequate storage capacity (Section 2.3d)
5. No record of laboratory examination (Section 2.3e)
6. Inadequate bacteriological sampling (Section 3.1)
7. Chemical quality - one of three samples exceeded the recommended iron limits (Section 5.2)

Orleans Woods Subdivision, Charleston County

The Orleans Woods Subdivision water system is owned and operated by the Coastal Water Company. The system serves about 225 people. It is under the general supervision of a certified water treatment plant operator. Finished water is purchased from the City of Charleston and distributed to residential customers. Charleston's responsibility for the water ends at the master meter. Coastal Water Company provides no additional pumping, storage or treatment. Chlorine residual was found in one of two locations in the subdivision checked at the time of the survey. The State Board of Health has not had the Orleans Woods system under surveillance and had no bacteriological record for the system. The supply has been under the surveillance and evaluation of county officials.

Bacteriological samples collected during the survey were negative. The following deviations from PHS Drinking Water Standards were observed:

1. Infrequent sanitary surveys (Section 2.2)
2. No cross-connection control program (Section 2.3b)
3. No record of bacteriological examinations (Section 2.3e)
4. No routine bacteriological sampling (Section 3.1)

Parish Place Subdivision - Mt. Pleasant, Charleston County

This is a small water system owned and operated by the Mt. Pleasant Water and Sewer Commission. The system had been in operation one year at the time of the study and served about 80 people on the fringe of Mt. Pleasant. It is under the direct supervision of a certified water treatment plant operator. The water supply source is six 60 foot deep shallow wells. There is no treatment. The State Board of Health has not had the Parish Place system under surveillance and had no bacteriological record for the system. County officials have had the system under surveillance. Bacteriological samples collected during the survey were negative. The following deviations from PHS Drinking Water Standards were observed:

1. Inadequate cross-connection control program (Section 2.3b)
2. No record of bacteriological examinations (Section 2.3e)
3. No routine bacteriological sampling (Section 3.1)
4. Chemical quality - one of four samples exceeded the recommended fluoride and iron limits and two samples exceeded the recommended manganese limits (Section 5.2)

Pinopolis, Berkeley County

This is a small community water system owned and operated by the A. D. Hare Water Works Company. It serves approximately 500 people in the Town of Pinopolis. Three 205 to 250 feet deep wells serve as a water supply source. There is no treatment. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the 12 months preceding the study. The water system is well operated and maintained. The following deviations from PHS Drinking Water Standards were observed:

1. No plumbing code (Section 2.3a)
2. Principal operator not certified
3. Insufficient bacteriological sampling (Section 3.1)

Water Company of Edisto Beach, Charleston County

The Water Company of Edisto Beach is privately owned and operated. The system serves approximately 500 people and is one three separate water systems in the community of Edisto Beach. The water supply source is one well. There is no treatment. The water is reported to be brackish. The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking Water Standards twice in the 12 months preceding the study and that a sufficient number of samples were examined only 2 of 12 months. One of three samples collected during the survey was positive for coliform. The

Pinopolis, Berkeley County

This is a small community water system owned and operated by the A. D. Hare Water Works Company. It serves approximately 500 people in the Town of Pinopolis. Three 205 to 250 feet deep wells serve as a water supply source. There is no treatment. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the 12 months preceding the study. The water system is well operated and maintained. The following deviations from PHS Drinking Water Standards were observed:

1. No plumbing code (Section 2.3a)
2. Principal operator not certified
3. Insufficient bacteriological sampling (Section 3.1)

Water Company of Edisto Beach, Charleston County

The Water Company of Edisto Beach is privately owned and operated. The system serves approximately 500 people and is one three separate water systems in the community of Edisto Beach. The water supply source is one well. There is no treatment. The water is reported to be brackish. The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking Water Standards twice in the 12 months preceding the study and that a sufficient number of samples were examined only 2 of 12 months. One of three samples collected during the survey was positive for coliform. The

samples were examined from the system (Coast Guard Station) during the 12 months preceding the study. These and the samples collected during the survey were negative. Chlorine residual was not found in the Folly Beach system at the time of the survey. The following deviations from PHS Drinking Water Standards were observed:

1. Infrequent sanitary surveys (Section 2.2)
2. Inadequate cross-connection control program (Section 2.3b)
3. No record of bacteriological examinations (Section 2.3e)
4. Inadequate bacteriological sampling (Section 3.1)
5. Chemical quality - one of three samples exceeded recommended iron and manganese limits (Section 5.2). The high iron and manganese are probably due to a residual carried over from the old well source which was heavily laden and finally abandoned because of poor chemical quality.

Isle of Palms, Charleston County

The Isle of Palms water system is owned and operated by the Isle of Palms Water Company, a private corporation. The system is under the direct supervision of a certified water treatment plant operator. It serves approximately 4,300 people in the coastal community of Isle of Palms. The water supply source is 100 - 1 1/4 inch well points from 18 to 22 feet deep which draw from a fresh water lens. The maximum safe dependable yield of the system is estimated at 0.5 mgd. Average use is already 0.35 mgd and services are increasing at the rate of 90 per year. Additional water supply will be needed soon.

collected at the time of the survey were also negative. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 8 below.
2. Inadequate water treatment (Section 2.1)
3. Infrequent sanitary surveys (Section 2.2)
4. No cross-connection control program (Section 2.3b)
5. Principal operator not certified
6. No record of laboratory examinations (Section 2.3e)
7. Inadequate bacteriological sampling (Section 3.1)
8. Chemical quality (fluoride 2.40 mg/l, boron 2.62 mg/l, chloride 820.0 mg/l and total dissolved solids 2758.5 mg/l) exceed mandatory and recommended limits (Section 5.2)

Population 1,000 to 5,000

Folly Beach, Charleston County

The Folly Beach water system is owned and operated by the Board of Township Commissioners, a public body. It serves approximately 2,000 full time residents on Folly Island. Summer resort population increases to about 20,000. Finished water is purchased from the City of Charleston and is distributed to residential customers. Charleston's responsibility for the water ends at the master meter. Folly Beach provides pumping and storage facilities. There is no further treatment. The State Board of Health has not had the Folly Beach system under continuous surveillance. Only two bacteriological

samples were examined from the system (Coast Guard Station) during the 12 months preceding the study. These and the samples collected during the survey were negative. Chlorine residual was not found in the Folly Beach system at the time of the survey. The following deviations from PHS Drinking Water Standards were observed:

1. Infrequent sanitary surveys (Section 2.2)
2. Inadequate cross-connection control program (Section 2.3b)
3. No record of bacteriological examinations (Section 2.3e)
4. Inadequate bacteriological sampling (Section 3.1)
5. Chemical quality - one of three samples exceeded recommended iron and manganese limits (Section 5.2). The high iron and manganese are probably due to a residual carried over from the old well source which was heavily laden and finally abandoned because of poor chemical quality.

Isle of Palms, Charleston County

The Isle of Palms water system is owned and operated by the Isle of Palms Water Company, a private corporation. The system is under the direct supervision of a certified water treatment plant operator. It serves approximately 4,300 people in the coastal community of Isle of Palms. The water supply source is 100 - 1 1/4 inch well points from 18 to 22 feet deep which draw from a fresh water lens. The maximum safe dependable yield of the system is estimated at 0.5 mgd. Average use is already 0.35 mgd and services are increasing at the rate of 90 per year. Additional water supply will be needed soon.

Treatment consists of chlorination. The system's bacteriological record for the 12 months preceding the study has been satisfactory except for a bad sample in August 1968 (15 check samples examined as follow-up were found to be within acceptable limits). However, only one-fifth the required number of samples have been examined. The samples collected at the time of the survey were also negative. The following deviations from PHS Drinking Water Standards were observed:

1. Inadequate bacteriological sampling (Section 3.1)
2. Bacteriological quality exceeds acceptable limits (Section 3.2)
3. Chemical quality - one of three samples exceeded the mandatory cadmium limits. Also, chloride (225.0 mg/l) and total dissolved solids (496.5 mg/l) are high. (Section 5.2)

Moncks Corner, Berkeley County

The Moncks Corner water system is municipally owned and operated. It serves approximately 4,200 people. The water supply source is 7 deep wells. There is no treatment. The system has only about 9 hours storage available. The elevated tank is in need of repair and maintenance. A need for more and larger water mains was expressed during the survey. The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking Water Standards twice in the 12 months preceding the study and that a sufficient number of samples were examined only 2 of the 12 months. Samples

collected at the time of the study were negative. The following deviations from the Drinking Water Standards were observed:

1. Inadequate water treatment (Section 2.1) - See Item 7 below.
2. No plumbing code (Section 2.3a)
3. No cross-connection control program (Section 2.3b)
4. Principal operator not certified
5. Inadequate storage capacity (Section 2.3d)
6. Insufficient bacteriological sampling (Section 3.1)
7. Bacteriological quality exceeds acceptable limits (Section 3.2)

St. Stephen, Berkeley County

The St. Stephen water system is municipally owned and operated. It serves about 1,600 people. The system is under the direct supervision of a certified water treatment plant operator. The water supply source is one 1,265-foot deep well. An older 160 foot well has, for all practical purposes, been abandoned. The new well water is of better chemical quality. There is no treatment. Inspection of the facilities disclosed a drainage problem at the well. The well is said to have had unsatisfactory bacteriological samples. It was also reported that there are two few water mains and those that have been installed are undersized. The system has about 10 hours storage available. The elevated tank is in need of maintenance. The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking

Water Standards four times in the 12 months preceding the study and that a sufficient number of samples were examined only 5 of the 12 months. Samples collected at the time of the survey were negative. The following deviations from the PHS Drinking Water Standards were observed:

1. Inadequate water treatment (Section 2.1) - See Item 9 below.
2. Inadequate source protection (Section 2.1)
3. No plumbing code (Section 2.3a)
4. No cross-connection control program (Section 2.3b)
5. Inadequate storage and distribution system capacities (Section 2.3d)
6. No record of bacteriological examinations (Section 2.3e)
7. Insufficient bacteriological sampling (Section 3.1)
8. Bacteriological quality exceeds acceptable limits (Section 3.2)
9. Chemical quality (boron 1.120 mg/l and fluoride 1.36 mg/l exceeds recommended limits (Section 5.2)

Sullivan's Island, Charleston County

The Sullivan's Island water system is municipally owned and operated. It serves approximately 1,692 people. The system is under the direct supervision of a certified water treatment plant operator. The water supply source is from thirty-two 14 to 20 feet shallow wells located in 5 well fields. These draw from fresh water lens. A 1,875 foot deep artesian well serves as an auxiliary source. Treatment

consists of chlorination. Inspection of the facilities disclosed poor maintenance and housekeeping. Chlorine residual was observed in only one of the two locations checked. The system's bacteriological record is satisfactory, however, only one-half the required number of samples have been collected during the 12 months preceding the study. Samples collected at the time of the survey were also negative. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 5 below.
2. Inadequate water treatment (Section 2.1)
3. No cross-connection control program (Section 2.3b)
4. Inadequate bacteriological sampling (Section 3.1)
5. Chemical quality (fluoride 3.38 mg/1, boron 3.278 mg/1, chloride 365.0 mg/1 and total dissolved solids 1191.5 mg/1) exceed mandatory and recommended limits (Section 5.2)

Population 5,001 to 10,000

Goose Creek, Berkeley County

The Goose Creek water system is owned and operated by the Coastal Water Company. The system serves approximately 7,200 people in the community of Goose Creek. It is under the general supervision of a certified water treatment plant operator. The source of water supply is seven wells. Chlorination is provided at only six of the well sites. The system is in need of additional wells and storage capacity. Low system pressures occur when any one of the

wells is out of service. On an average day, there is only about two hours storage available. Poor maintenance and drainage was observed at some of the well sites. The system has also been plagued with water main and service connection breaks. Customer taste and odor complaints have also been registered. The State Board of Health has had the system under special surveillance because of these difficulties. The management complains of insufficient funds to meet all State recommendations. The system's bacteriological record is satisfactory, however, an adequate number of samples have been examined during only 2 of the 12 months preceding the study. Samples collected at the time of the survey were also negative. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable water supply source (Section 2.1) - See Item 9 below.
2. Inadequate water treatment (Section 2.1)
3. Insufficient response to sanitary survey recommendations (Section 2.2)
4. No plumbing code (Section 2.3a)
5. No cross-connection program (Section 2.3b)
6. Inadequate well and storage capacities (Section 2.3d)
7. No record of bacteriological examinations or chlorine dosage (Section 2.3e)
8. Insufficient bacteriological samples (Section 3.1)
9. Chemical quality (fluoride 3.37 mg/l and total dissolved solids 643.5 mg/l) exceed mandatory and recommended limits.

Also, one of five samples exceeded the recommended copper limits. (Section 5.2)

Mt. Pleasant, Charleston County

The Mt. Pleasant water system is owned and operated by the Mt. Pleasant Water and Sewer Commission, a municipal body. The system serves about 7,500 people. It is under the direct supervision of a certified water treatment plant operator. The water supply source is from one 515 foot deep artesian well and twenty-five 55 foot shallow wells. It is estimated that the shallow wells provide approximately two-thirds the supply and the deep well one-third. Treatment consists of coke tray aeration, pressure sand filtration and chlorination. Plant capacity is rated at 1000 gpm (1.44 mgd) vs. an average output of 0.6 mgd.

The most difficult problem with the system has been in obtaining an adequate and satisfactory supply. The community has experienced a severe water shortage upon occasion. It has been necessary to shut down the system for approximately five hours at a time to allow the sources to recover. Water use in the area is expected to double in the next 10 years, further underscoring the need for increased supply. Water works officials have conferred with the City of Charleston about bringing water from Charleston across the Cooper River, but the costs have been disappointing. Plans are underway to construct a new 1,800-foot well during the summer of 1969 which will hopefully alleviate the current critical water shortage.

The system's bacteriological record is satisfactory, however, only one-eighth the required number of samples have been collected during the 12 months preceding the study. The following deviations from PHS Drinking Water Standards were observed:

1. Undesirable and inadequate water supply source (Section 2.1 and Section 2.3d)
2. Inadequate cross-connection control program (Section 2.2b)
3. Insufficient bacteriological sampling (Section 3.1)
4. Chemical quality (chloride 430.0 mg/1, fluoride 1.27 mg/1 and total dissolved solids 830.5 mg/1) exceed recommended limits. Also, two of three samples exceed the mandatory fluoride limits. (Section 5.2)

Population More Than 10,000

Charleston, Charleston County

The City of Charleston's water system is owned and operated by the Charleston Commissioners of Public Works, a municipal body. It is operated under the direct supervision of certified water treatment plant operator. The system, with an average daily output of 25 mg, is the largest in the area and serves approximately 220,000 people (about 75 per cent of the SMSA) over a 113 square mile area. It is also the only system in the statistical area using surface water as as source of supply.

Charleston's principal water source is the Edisto River some 20 miles away. Withdrawal is limited to 100 mgd by State Statutes.

The Edisto River is considered an excellent raw water source, however, water quality has deteriorated during the past three years. Color characteristics have changed making treatment more difficult and coliform counts have increased (a raw water sample collected during the survey had a count of 11 coliform/100 ml). Treatment consists of screening, prechlorination, coagulation, sedimentation, rapid sand filtration, taste and odor control, ph adjustment and post chlorination. Plant capacity is rated at 42 mgd vs. an average daily output of 25 mgd.

The Charleston municipal supply serves airline and vessel watering facilities which are used by carriers operating interstate. Under provisions of the Interstate Quarantine Regulations, PHS representatives periodically review such systems with State health authorities to certify the supply's acceptability for continued use by interstate carriers. The last PHS-State joint survey of the Charleston system was made on August 27-28, 1968. At that time, the supply was classified "Provisionally Approved" because of inadequate bacteriological surveillance, open finished water reservoirs, inadequate chlorination and the need for more emphasis on cross-connection control. Unsafe chlorine handling was also observed.

The system's bacteriological record shows that bacteriological quality failed to meet PHS Drinking Water Standards quality twice in the 12 months preceding the Community Water Supply Study. Also, that sufficient samples were examined only two of these months.

Samples collected at the time of the study were negative. However, residual chlorine was found in only 5 of 16 representative locations throughout the distribution system. Other observed deficiencies included: inadequate filter backwash procedures as indicated by mud and mud balls on filter surfaces; poor maintenance; low system pressure in the James Island area; a need for additional laboratory personnel and facilities; and, perhaps most important, a definite lack of communication between management and laboratory phases of the system's operation which severely hampers effective quality control. The uncovered clear wells, less than desirable emphasis on cross-connection control, and unsafe chlorine handling practices were re-verified. It was concluded that the Charleston Municipal Water System was properly classified "Provisionally Approved" for interstate carrier purposes primarily because:

1. Inadequate bacteriological sampling (Section 3.1)
2. Bacteriological quality exceeds acceptable limits (Section 3.2)

It should be noted that sufficient improvement was made to the Charleston system after the survey to warrant an "Approved" classification on August 8, 1969. However, several deficiencies - uncovered clear wells, unsafe chlorine handling, temporary laboratory, low pressures in the James Island area and low chlorine residuals in some parts of the system - still remain and require additional emphasis.

APPENDIX B

WATER QUALITY DATA

CODING OF TREATMENT

FOR COMMUNITY WATER SUPPLIES

I. ID No. - Example for 150005600100, Albany, Vermont.

The ID No. is the location code for a particular water supply facility.

Broken down, it consists of a Regional Code Number (1 digit); a State Code Number (2 digits); a City Code Number (5 digits); a County Code Number (3 digits) and one digit unassigned for a total of 12 digits.

REGION	STATE	CITY	COUNTY	UNASSIGNED
I	50	00560	010	0

If more than one facility is associated with a city, the fifth digit in the city code designates this fact.

II. POP

Population is decimal numeric and designates the population served by a particular facility.

III. O

Ownership is decimal numeric and designates the type of ownership as follows:

1 - Municipal
2 - Private
3 - Trailer Park
4 - Institution

IV. IMP

Improvements needed is Binary numeric and is a cumulative total of the types of improvements needed according to the following:

000 - None
001 - Ground source
002 - Surface source
004 - Transmission line
008 - Pumping units
016 - Treatment plant
032 - Ground storage
064 - Elevated storage
128 - Distribution system
256 - Other improvements

V. TREATMENT PROCESSES

A. All of the processes from coagulation or softening through recarbonation (COA-RC) are OCTOL Numeric and are cumulative totals according to the following:

1. COA

Chemicals used for coagulation or softening

000 - None
001 - Alum
002 - Coagulant aids
004 - Iron Salts
010 - Lime
020 - Soda ash
040 - Activated Silica
100 - Other coagulant

2. COR

Chemicals used for Corrosion Correction or Water Stabilization

00 - None
01 - Phosphate compounds
02 - Chlorine gas
04 - Hypochlorite
10 - Sodium silicate
20 - Alkali fed for pH adjustment
40 - Coagulant aids

3. TO

Chemicals used for Taste and Odor Control

00 - None
01 - Activated carbon
02 - Chlorine dioxide
04 - Permanganate
10 - Sulphur dioxide
20 - Ozone
40 - Other

4. MIX

Mixing Device and Tank

000 - None
001 - Air Agitation
002 - Baffle Mix
004 - Hydraulic
010 - Injection or pump suction
020 - Slow mechanical mix
040 - Patented sludge blanket
100 - Rapid mechanical mix
200 - "Liquon Reactor"; Accelator"; or "Precipitator"
400 - Other

5. AER

Aeration

00 - None
01 - Contact beds or trays (Coke or other material)
02 - Patented aerator
04 - Overflow trays (Cascade or other splash aerator)
10 - Other

6. SED

Sedimentation

00 - None
01 - Baffled basins
02 - Covered basins
04 - Mechanical sludge removal
10 - Upflow tanks
20 - "Liquon Reactor"; "Accelator"; or "Precipitator"
40 - Other

7. FILTERS

a. FIT

TYPE FILTERS

000 - None
001 - Roughing or contact
002 - Gravity (slow) (2 GPM/SQFT or less)
004 - Gravity (Rapid) (Between over 2 and 5 GPM/SQFT)
010 - High rate (Over 5 GPM/SQFT)
020 - Pressure
040 - Ion exchange
101 - Other

b. FIM

FILTER MEDIA

00 - None
01 - Sand
02 - Anthrafilt
04 - Diatomaceous earth
10 - Mixed Media
20 - Zeolite
40 - Other

8. AM

AMONIATION

0 - None
1 - Ammonium Compound
2 - Ammonia gas
4 - Both

9. RC

REARBONATION

0 - No
1 - Yes

B. FL

FLUORIDE ADJUSTMENT is decimal numeric and designates the type of chemical used or the reduction process.

0 - None
1 - Hydrofluosilic acid
2 - Sodium silicofluoride
3 - Sodium fluoride
4. - Ammonium silico fluoride
5 - Other fluorides
6 - Fluoride reduction

C. DIS

DISINFECTION is binary numeric and is a cumulative total if more than one chemical or process is used.

000 - None
001 - Chlorine Gas
002 - Dechlorination
004 - Hypochlorites
008 - Chloramines
016 - Free residual chlorine
032 - Ultraviolet
064 - Chlorine dioxide
128 - Ozone
256 - Other

D. CL

CHLORINATION designates if purchased water.

0 - Not disinfected
4 - Disinfected

VI. SOURCE OF SUPPLY

SOURCE OF SUPPLY is alpha-numeric and designates where the raw water came from.

VII. AV DAY

AVERAGE DAYS USE is decimal numeric and designates the millions of gallons of water used per day.

[illegible] EXCEPT: REMAINING WATER QUALITY DATA FROM "PASS" COMPARED TO USPHS STANDARDS
[illegible] FOR PCT. CCE/FORMS PER 100/ML. TURB. AND COLOR IN STD. UNITS

0704 0450990100BC BEASLEY COUNTRY CLUB SUBDIV. WATER SUPPLY, RT.2, BOX 284 WACCAMAW CORNER,S. CAROLINA 29461

ID NO	POP	T	C	IMP	COA	COR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
0450990100BC	200	1	2	520	000	00	00	000	00	00	000	000	0	0	0	000	0	2 WELLS	

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0003	0003	0000	0002 *	0003	0001	0001	0001	0003	0001	0001	NO.
.00		.000	.000		1.44	.004	1.6	.004	3.0	.008	5.15	15.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
NO.	0001	0001	0001	0003	0001	0002	0002	0003	0001	0001	0001	0002	
	.00	.44	29.	.029	.000	.015	.000	.000	499.	0.	0.	0.0	01

MAXIMUM

AS	BA	CD	CR	CCE	F 2	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
.00		.000	.000		1.46 *	.007	1.6	.004	3.0	.017	5.15	15.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
EXCD												
	.00	.44	29.	.042	.000	.017	.000	.000	499.	L 5.	0.	0.0

0503 0450990200B0 CAROLINA VILLAGE SUBDIVISION COASTAL WATER CO. GOOSE CREEK, S. CAROLINA 29445

ID NO	POP	T	C	IMP	COA	COR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
0450990200B0	140	1	2	720	000	00	00	000	00	00	000	000	0	0	0	000	0	1 WELL	000.09

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0002	0002	0000	0002 **	0002	0001	0001	0001	0002	0001	0001	NO.
.04		.000	.000		3.10	.019	0.4	.003	43.	.005	0.19	12.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
NO.	0001	0001	0001	0002	0001	0002	0002	0002	0001 *	0001	0001	0002	
	.00	.89	191.	.730	.003	.004	.001	.000	674.	0.	0.	0.0	02

MAXIMUM

AS	BA	CD	CR	CCE	F 2	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
.04		.000	.000		3.10 **	.024	0.4	.003	43.	.007	0.19	12.	

	AS	B	CL	CU 1	CN	FE	MN	AG	TDS I	COLOR	ALPHA	COLI
EXCD				*					=			
	.00	.89	191.	1.453	.003	.006	.003	.000	674.	L 5.	0.	0.0

* EXCEEDS RECOMMENDED STANDARDS, ** EXCEEDS MANDATORY STANDARDS, = LESS THAN OPTIMUM CONCENTRATION OF F.

[illegible] ORIGINAL DATA PUBLIC WATER SUPPLY SYSTEMS COMPARED TO EPHS STANDARDS
[illegible] MG/L. EXCEPT PH IN PH UNITS. COLOR IN C.U. TURB. IN J.T.U. UNITS

0003 4405000930080 COLLEGE PARK SUBDIV [illegible] COASTAL WATER CO. GOOSE CREEK, S. CAROLINA 29461

IC RC	POP	T C	INP	COA	CCR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
4405000930080	200	1	2	520	000	00	00	000	00	00	000	000	0	0	0	000	0 1 WELL	000.01

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0002	0002	0000	0001	0002	0001	0001	0001	0002	0001	0001	NO.
.04		.000	.022		2.65 **	.000	0.4	.002	36.	.011	0.35	11.	

AG	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
NO. 0001	0001	0001	0002	0001	0001	0001	0002	0001	0001	0001	0001	
.00	.73	100.	.066	.001	.006	.000	.000	637. *	8.	0.	0.0	02

MAXIMUM

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
					1								
.04		.001	.049		2.65 **	.000	0.4	.002	36.	.014	0.35	11.	*

AG	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
EXCD								1				
.00	.73	100.	.126	.001	.006	.000	.000	637. *	8.	0.	0.0	

0003 4405000940080 RAND-O-PINES SUBDIVISION COASTAL WATER CO. GOOSE CREEK, S. CAROLINA 29445

IC RC	POP	T C	INP	COA	CCR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
4405000940080	036	1	2	520	000	00	00	000	00	00	000	000	0	0	0	000	0 1 WELL	000.14

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0001	0002	0002	0000	0002	0002	0001	0001	0001	0002	0001	0001	NO.
.04	.00	.002	.021		0.63 □	.000	0.0	.005	1.3	.049	4.25	11.	

AG	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
NO. 0001	0001	0001	0002	0001	0002	0002	0002	0001	0001	0001	0001	
.00	.13	81.	.009	.005	.218	.002	.003	420.	0.	0.	0.0	00

MAXIMUM

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
					□								
.04	L .000	.004	.042		0.64	.000	L .1	.005	1.3	.085	4.25	11.	*

AG	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
EXCD					1							
.00	.13	81.	.013	.005	.428 *	.005	.004	420.	L 5.	0.	0.0	

* EXCEEDS RECOMMENDED STANDARDS. ** EXCEEDS MANDATORY STANDARDS. □ LESS THAN OPTIMUM CONCENTRATION OF F.

PRINTING WATER QUALITY DATA FROM NCSSS COMPARED TO DRINKING WATER STANDARDS
EXCEPT RADIATION IN PC/L, PARTICLES PER 100/ML, TURB. AND COLOR IN STD. UNITS

0020 4491480000100 CHARLESTON COMM. OF PUBLIC WORKS CHARLESTON, S. CAROLINA 29401
ID NC POP T C TYP COA COR TO MIX AER SED FIT FIM AM RC FL DIS CL SOURCE OF SUPPLY AV DAY
4491480000100 220000 4 1 SOC 001 20 00 000 00 40 004 001 0 0 0 001 0 EDISTO RIVER, GOOSE CREEK AUX. 025.00

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0002	0000	0027	0027	0001	0027	0027	0002	0002	0002	0027	0002	0002	NO.
.07		.000	.009	.123	0.01	.005	0.2	.006	13.	.013	0.52	7.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
NO.	0002	0002	0002	0027	0002	0027	0027	0027	0002	0002	0002	0026
	.00	.14	8.1	.056	.000	.062	.004	.000	217.	0.	0.	00 0.0

MAXIMUM

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
.11		.002	.029	.123	0.11	.029	0.4	.008	23.	.049	0.90	13.	*

EXCD	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
	.00	.29	11.	.326	.000	.137	.013	.002	366.	L 5.	0.	0.0

0009 4491480010100 ASHCROFT HALL SUBDIVISION JAMES ISLAND UTILITY COMPANY CHARLESTON, S. CAROLINA 29401
ID NC POP T C TYP COA COR TO MIX AER SED FIT FIM AM RC FL DIS CL SOURCE OF SUPPLY AV DAY
4491480010100 085 0 2 000 00 00 000 00 00 000 000 0 0 0 000 4 /CHARLESTON/ 4491480000100 000.00

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0003	0003	0001	0003	0003	0001	0001	0001	0003	0001	0001	NO.
.11		.000	.000	.123	0.00	.013	0.0	.008	23.	.010	0.90	2.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
NO.	0001	0001	0001	0003	0001	0003	0003	0003	0001	0001	0001	0002
	.00	.00	5.[illegible]	.044	.000	.030	.001	.000	67.	0.	0.	00 0.0

MAXIMUM

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
.11		.000	.000	.123	LO.10	.014	L .1	.008	23.	.014	0.90	2.	

EXCD	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
	.00	.00	9.9	.061	.000	.033	.002	.002	67.	L 5.	0.	0.0

* EXCEEDS RECOMMENDED STANDARDS, ** EXCEEDS MANDATORY STANDARDS, □ LESS THAN OPTIMUM CONCENTRATION OF F.

[illegible] DRINKING WATER QUALITY DATA FROM PROCESS COMPARED TO USPHS STANDARDS
[illegible] AVERAGES IN MG/L, EXCEPT PH IN STD. UNITS, TURB. AND COLOR IN STD. UNITS

0003 0445148070100 CHLEANS WOODS SUBDIVISION COASTAL WATER COMPANY CHARLESTON, S. CAROLINA 29401

ID NO	POP	T	C	IMP	COA	CCR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
0445148070100	225	8	2	020	000	00	00	000	00	00	000	000	000	C	0	0	000	4 /CHARLESTON/ 445148000100	000.01

AVERAGE

APB	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0003	0003	0001	0003	0003	0001	0001	0001	0003	0001	0001	NO.
.11		.000	.000	.123	0.07 □	.004	0.0	.008	23.	.012	0.90	2.	

RC.	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
	0001	0001	0001	0003	0001	0003	0003	0003	0001	0001	0001	0002	
.00	.00		5.5	.045	.000	.044	.000	.001	67.	0.	0.	0.0	00

MAXIMUM

APB	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
.11		.000	.000	.123	0.12 □	.014	L .1	.008	23.	.016	0.90	2.	

EXCD	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
	.00	.00		5.5	.055	.000	.058	.001	.003	67.	L 5.	0.	0.0

0002 0445290010100 EDISTO BEACH WATER COMPANY EDISTO BEACH, S. CAROLINA 29438

ID NO	POP	T	C	IMP	COA	CCR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
0445290010100	190	1	2	020	000	00	00	000	00	00	000	000	0	0	0	000	0	1 WELL	000.00

AVERAGE

APB	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0002	0002	0000	0002	0002	0001	0001	0001	0002	0001	0001	NO.
.00		.004	.020		2.80 **	.000	0.4	.002	80.	.021	16.50 *	27.	

RC.	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
	0001	0001	0001	0002	0001	0002	0002	0002	0001	0001	0001	0002	
.00	2.40 *		1950. *	.027	.000	.404 *	.009	.008	2381. *	0.	0.	0.0	06

MAXIMUM

APB	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
.04		.004	.021		3.00 2 **	.000	0.4	.002	80.	.024	16.50 * 1	27.	*

EXCD	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
			1	1		1			1			
	.00	2.40 *		1950. *	.043	.000	.499 *	.011	.010	2381. *	L 5.	0.	0.0

* EXCEEDS RECOMMENDED STANDARDS, ** EXCEEDS MANDATORY STANDARDS, □ LESS THAN OPTIMUM CONCENTRATION OF F.

FEB 28, 1978 DRINKING WATER QUALITY DATA FROM PROCESS COMPARED TO USPHS STANDARDS
UNITS ARE MG/L EXCEPT: RADIATION IN PC/L, COLIFORMS PER 100/ML, TURB. AND COLOR IN STD. UNITS

0003 4405290020100 WATER COMPANY OF EDISTO BEACH EDISTO BEACH, S. CAROLINA 29438
ID NO POP T C IMP COA CCR TO MIX AER SED FIT FIM AM RC FL DIS CL SOURCE OF SUPPLY Av DAY
4405290020100 900 1 2 020 000 00 00 000 00 00 000 000 0 0 0 000 0 1 WELL 000.02
AVERAGE
AVERAGE
AG BA CD CR CCE F PB NO3 SE SO4 ZN TURB BETA
0001 0000 0003 0003 0000 0003 0003 0001 0001 0001 0003 0001 0001 NO.
** 03
.04 .001 .000 3.70 .008 0.2 .005 45. .015 0.20 14.

AG B CL CU CN FE MN AG TDS COLOR ALPHA COLI
NO. 0001 0001 0001 0003 0001 0003 0003 0003 0001 0001 0001 0003
* *
.00 1.69 662. .018 .000 .017 .000 .000 289. 0. 0. 0.7

MAXIMUM
MAXIMUM
AG BA CD CR CCE F PB NO3 SE SO4 ZN TURB BETA
EXCD
3 *
** 04
.04 .002 .000 3.70 .015 0.2 .005 45. .022 0.20 14.

AG B CL CU CN FE MN AG TDS COLOR ALPHA COLI
1
EXCD 1 1
* *
.00 1.69 662. .037 .000 .037 .000 .002 289. L 5. 0. 2.0

* * * *

DRINKING WATER QUALITY DATA FROM RCWSSP COMPARED TO SDHS STANDARDS
EXCEPTS ARE MICROMHOS PER CM, COLIFORMS PER 100/ML, TURB. AND COLOR IN STD. UNITS

0003 4453795000080 ELM VILLAGE TRAILER PARK WATER SUPPLY, P.O. BOX 7010 CHARLESTON HEIGHTS, S.C. 29405
ID NO POP T C IMP COA CCR TC MIX AER SED FIT FIM AM RC FL DIS CL SOURCE OF SUPPLY AV DAY
4453795000080 141 0 3 001 000 00 00 000 00 00 000 000 0 0 0 000 0 2 WELLS

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE NO.
0001	0000	0002	0002	0000	0002	0002	0001	0001	0001	0002	0001	0001	
.11		.001	.000		1.95 **	.007	0.1	.008	26.	.004	0.72	2.	

AG	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
0000	0001	0001	0002	0001	0002	0002	0002	0001	0001	0001	0002	01
.00	.00	6.1	.003	.000	.004	.002	.000	86.	**	*.	0.0	

MAXIMUM

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
					2								
.11		.002	.000		2.00 **	.014	0.1	.008	26.	.004	0.72	2.	

AG	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	EXCD
.00	L .100	6.1	.004	.000	.006	.002	.000	86.	L 5.	0.	0.0	

* * * \

FILES MAY 29, 1979 DRINKING WATER QUALITY DATA FROM PC-SSF COMPARED TO USPHS STANDARDS
UNITS ARE MG/L EXCEPT: RADIATION IN PC/L, COLIFORMS PER 100/ML, TURB. AND COLOR IN SCU, UNITS

0002 0493090000100 PORT JOHNSON WATER SUPPLY CHARLESTON MEDICAL SCHOOL CHARLESTON, SOUTH CAROLINA 29401

ID NO	POP	T	C	IMP	COA	CCR	TC	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
0493090000100	025	9	4	020	000	00	00	00	00	00	000	000	0	0	0	000	0	5 WELLS	000.00

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0002	0002	0000	0001	0002	0001	0001	0001	0002	0001	0001	NO.
.09		.002	.050		0.13	.010	0.3	.002	5.5	3.740	0.42	1.	

NO.	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
	0001	0001	0001	0002	0001	0001	0001	0002	0001	0001	0001	0001	
	.00	.00	44.	.030	.000	.035	.064	.001	117.	0.	0.	0.0	01

PASSIVE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
			1							1			
			**		□					*			
.09		.002	.060		0.13	.021	0.3	.002	5.5	5.763	0.42	1.	

EXCD	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
							1						
							*						
	.00	L .100	44.	.041	.000	.035	.064	.003	117.	L 5.	0.	0.0	

0003 0493440900080 COASTAL UTILITY CO - GOOSE CREEK GOOSE CREEK, S. CAROLINA 29445

ID NO	POP	T	C	IMP	COA	CCR	TC	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
0493440900080	7200	1	2	521	000	00	00	000	00	00	000	000	0	0	0	001	0	7 WELLS	001.58

AVERAGE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	AVERAGE
0001	0000	0004	0004	0000	0004	0004	0001	0001	0001	0004	0001	0001	NO.
.01		.000	.011		3.37	.003	0.4	.003	40.	.006	0.13	11.	

NO.	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
	0001	0001	0001	0004	0001	0004	0004	0004	0001	0001	0001	0003	
	.00	.80	101.	.436	.002	.005	.000	.005	644.	0.	0.	0.0	02

PASSIVE

AS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	MAXIMUM EXCD
					4								
					**								*
.09		.001	.046		3.70	.015	0.4	.003	40.	.010	0.13	11.	

EXCD	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
				1					1				
				*					*				
	.00	.80	101.	1.348	.002	.010	.000	.019	644.	L 5.	0.	0.0	

* EXCEEDS RECOMMENDED STANDARDS, ** EXCEEDS MANDATORY STANDARDS, □ LESS THAN OPTIMUM CONCENTRATION OF F.

[illegible] WATER QUALITY DATA FROM PC-SSC COMPARED TO USPHS STANDARDS
[illegible] MG/L EXCEPT pH IN STD. UNITS

0003 0000320000150 ISLE OF PALMS WATER CO. ISLE OF PALMS, S. CAROLINA 29451
ID NO PUP T C TOX FCM FC FIX AER SED FIT FIM AM RC FL DIS CL SOURCE OF SUPPLY AV DAY
0000320000150 0300 1 2 000 000 00 00 000 00 00 000 000 0 0 0 004 0 100 WELLS 000.35

PURPOSE AVERAGE
AFS BA CD CR CCR F PB NO3 SE SO4 ZN TURB BETA AVERAGE
0001 0000 0003 0003 0000 0003 0003 0001 0001 0001 0003 0001 0001 NO.
.07 .000 .000 @ 0.56 .019 6.2 .006 35. .352 0.29 5.

AG CD B CL CU CN FE MN AG TDS COLOR ALPHA COLI
MG. 0001 0001 0001 0003 0001 0003 0003 0003 0001 0001 0001 0002 00
.00 .22 229. .044 .000 .039 .017 .000 497. 8. 0. 0.0

PURPOSE MAXIMUM MAXIMUM
AFS BA CD CR CCR F PB NO3 SE SO4 ZN TURB BETA EXCD
1
** @
.07 .022 .000 0.64 .023 6.2 .006 35. .553 0.29 5.

AG B CL CU CN FE MN AG TDS COLOR ALPHA COLI
EXCD
1 .090 .22 229. .000 .000 .090 .050 .000 497. 8. 0. 0.0

0003 0000320050100 BURROWS SUBDIVISION JOHNS ISLAND, S. CAROLINA 29455
ID NO PUP T C TOX COR CCR FC FIX AER SED FIT FIM AM RC FL DIS CL SOURCE OF SUPPLY AV DAY
0000320050100 100 1 2 000 000 00 00 000 00 00 000 000 0 0 0 004 0 4 WELLS

PURPOSE AVERAGE
AFS BA CD CR CCR F PB NO3 SE SO4 ZN TURB BETA AVERAGE
0001 0000 0003 0003 0000 0002 0003 0001 0001 0001 0003 0001 0001 NO.
@ #
.00 .000 .000 0.20 .016 0.4 .002 51. .040 6.25 3.

AG CD B CL CU CN FE MN AG TDS COLOR ALPHA COLI
MG. 0001 0001 0001 0003 0001 0002 0002 0003 0001 0001 0001 0002 02
* .00 .00 48. .013 .002 .746 .040 .000 274. 0. 0. 0.0

PURPOSE MAXIMUM MAXIMUM
AFS BA CD CR CCR F PB NO3 SE SO4 ZN TURB BETA EXCD
1
@ #
.00 .001 .000 0.30 .022 0.4 .002 51. .042 6.25 3.

AG B CL CU CN FE MN AG TDS COLOR ALPHA COLI
EXCD
2
*
.00 L .100 48. .027 .002 .789 .042 .000 274. L 5. 0. 0.0

* EXCEEDS RECOMMENDED STANDARDS, ** EXCEEDS MANDATORY STANDARDS, @ LESS THAN OPTIMUM CONCENTRATION OF F.

THE MAY 26, 1970 DRINKING WATER QUALITY DATA FROM "CROSS" COMPARED TO USPHS STANDARDS
UNITS ARE MG/L EXCEPT: RADIATION IN PC/L, COLIFORMS PER 100/ML, TURB. AND COLOR IN STD. UNITS

0004 4456060S0100 MARSH PLACE SUBDIVISION MOUNT PLEASANT, S. CAROLINA29464

ID NC	POP	T	C	IMP	COA	CGR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
4456060S0100	080	1	1	000	000	00	00	000	00	00	000	000	0	0	0	000	0	4 WELLS	000.01

	ABS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	
AVERAGE	0001	0000	0004	0004	0000	0003	0004	0001	0001	0001	0004	0001	0001	NO.
	.15		.001	.000		0.66 □	.013	0.2	.002	23.	.032	1.20	5.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
NC.	0001	0001	0001	0004	0001	0003	0003	0004	0001	0001	0001	0002	00
	.00	.00	30.	.046	.000	.113	.025	.000	234.	0.	0.	0.0	

	ABS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	
MAXIMUM EXCD							MAXIMUM							MAXIMUM
	.15		.005	.000		1.64 * 1	.030	0.2	.002	23.	.049	1.20	5.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
EXCD							* 1					
	.00	L .100	30.	.098	.000	.181	.058	.003	234.	L 5.	0.	0.0

* *

0003 4457040100S0 HARE,A.D. WATER WORKS PINOPOLIS, S. CAROLINA 29469

ID NC	POP	T	C	IMP	COA	CGR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
4457040100S0	500	1	2	000	000	00	00	000	00	00	000	000	0	0	0	000	0	3 WELLS	

	ABS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	
AVERAGE	0001	0001	0003	0003	0000	0002	0003	0001	0001	0001	0003	0001	0001	NO.
	.04	.00	.001	.025		0.56 □	.017	0.0	.003	0.0	.235	0.32	5.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
NC.	0001	0001	0001	0003	0001	0002	0002	0003	0001	0001	0001	0002	00
	.00	.00	36.	.004	.000	.058	.004	.002	294.	0.	0.	0.0	

	ABS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	
MAXIMUM EXCD							MAXIMUM							MAXIMUM
	.04	L .200	.002	.038		0.64 □	.023	0.0	.003	0.0	.443	0.32	5.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI
EXCD												
	.00	L .100	36.	.006	.000	.104	.004	.003	294.	L 5.	0.	0.0

* EXCEEDS RECOMMENDED STANDARDS. ** EXCEEDS MANDATORY STANDARDS. □ LESS THAN OPTIMUM CONCENTRATION OF F.

THE MAY 26, 1970 DRINKING WATER QUALITY DATA FROM "CRSS" COMPARED TO USPHS STANDARDS
UNITS ARE MG/L EXCEPT: RADIATION IN PC/L, COLIFORMS PER 100/ML, TURB. AND COLOR IN STD. UNITS

0CC6 445774000080 ST STEPHEN MUNICIPAL WATER WORKSCITY HALL — ST. STEPHEN, S. C. 29479

ID NC	POP	T	C	IMP	COA	CCR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
445774000080	1600	1	1	720	000	00	00	000	00	00	000	000	0	0	0	000	0	1 WELL	000.13

AVERAGE

ABS 0CC1	BA 0001	CD 0003	CR 0003	CCE 0000	F 0002	PB 0003	NO3 0001	SE 0001	SO4 0001	ZN 0003	TURB 0001	BETA 0001	NO.
.04	.00	.001	.013		1.32*	.016	0.2	.004	0.0	.077	0.25	5.	

	AS 0001	B 0001	CL 0001	CU 0003	CN 0001	FE 0002	MN 0002	AG 0003	TDS 0001	COLOR 0001	ALPHA 0001	COLI 0002	
NC.													02
	.00	1.12*	13.	.012	.001	.027	.004	.000	366.	8.	0.	0.0	

MAXIMUM

ABS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	EXCD
.04	L .200	.002	.039		1.32*2	.031	0.2	.004	L 1.0	.198	0.25	5.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
EXCD													1
	.00	1.12*	13.	.015	.001	.039	.305	.000	366.	8.	0.	0.0	

0003 445844000100 SULLIVANS ISLAND CITY WATER WKS CITY HALL — SULLIVANS ISLAND, S. C. 29482

ID NC	POP	T	C	IMP	COA	CCR	TO	MIX	AER	SED	FIT	FIM	AM	RC	FL	DIS	CL	SOURCE OF SUPPLY	AV DAY
445844000100	1692	1	1		000	00	00	000	00	00	000	000	0	0	0	001	0	5 WELLS	000.09

AVERAGE

ABS 0CC1	BA 0000	CD 0003	CR 0003	CCE 0000	F 0003	PB 0003	NO3 0001	SE 0001	SO4 0001	ZN 0003	TURB 0001	BETA 0001	NO.
.08		.003	.000		3.38**	.000	3.4	.004	6.5	.015	0.18	0.	

	AS 0001	B 0001	CL 0001	CU 0003	CN 0001	FE 0003	MN 0003	AG 0003	TDS 0001	COLOR 0001	ALPHA 0001	COLI 0002	
NC.													04
	.00	3.28*	365.*	.067	.000	.012	.003	.005	1192.*	8.	0.	0.0	

MAXIMUM

ABS	BA	CD	CR	CCE	F	PB	NO3	SE	SO4	ZN	TURB	BETA	EXCD
.08		.008	.000		4.40**3	.000	3.4	.004	6.5	.020	0.18	0.	

	AS	B	CL	CU	CN	FE	MN	AG	TDS	COLOR	ALPHA	COLI	
EXCD		1	1						1				
	.00	3.28*	365.*	.164	.000	.020	.006	.007	1192.*	8.	0.	0.0	

* EXCEEDS RECOMMENDED STANDARDS. ** EXCEEDS MANDATORY STANDARDS. □ LESS THAN OPTIMUM CONCENTRATION OF F.

APPENDIX C

FORMS USED TO GATHER DATA

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Consumer Protection and Environmental Health Service
Environmental Control Administration
Bureau of Water Hygiene

PCA-18 (7-65)
(2-69)

INVENTORY OF MUNICIPAL WATER FACILITIES

STATE

LATEST DATA IN PHS FILES | CURRENT DATA

COMMUNITY	POPULATION: ESTIMATED POPULATION SERVED	YEAR OPER. STARTED: PRESENT SUPPLY	PRESENT TREATMENT PLANT	OWNERSHIP
1	2	3		4

COMMUNITY OR FACILITY
LOCATION (1) a
Correct legal name
Postal address of utility
COUNTY (1) b

1960 CENSUS POPULATION (2) a	CURRENT ESTIMATED POPULATION SERVED (2) b	LAB. CONTROL (3)	OWNERSHIP (4)

NUMBER OF SERVICES	NUMBER OF METERS	LAB. CONTROL	SOURCE OF SUPPLY	SAFE YIELD IMPOUNDED MG	MAXIMUM DEPEND. DRAFT (GR. WATER) MG
5		6	7		8

(5) CLASSIFICATION	NUMBER OF SERVICES	NUMBER OF METERS	MGD AVG. WATER
RESIDENTIAL a			
COMMERCIAL b			
INDUSTRIAL c			
PUBLIC d			
TOTAL e			

SOURCE OF SUPPLY (6)

SAFE YIELD IMPOUNDED MG (7) a

MAXIMUM DEPENDABLE DRAFT (GR. WATER) MG (7) b

RATED PLANT CAPACITY MGD	AVERAGE PLANT OUTPUT MGD	TREATMENT	DISTRIBUTION STORAGE: PUMPED TO MAINS	IMPROVEMENTS NEEDED
9		10	11	12

RATED CAPACITY MGD (8) a	AVERAGE (8) b OUTPUT MGD	EMERGENCY POWER (8) c	TREATMENT (9) a	DIST. STORAGE: PUMPED TO MAINS MG (10) a	DIST. STORAGE: GRAVITY TO MAINS MG (10) b	IMPROVEMENTS NEEDED (11)

REMARKS

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MUNICIPAL WATER SUPPLY SANITARY SURVEY

BOB #85-S69004
Exp. March 1970
SURVEY DATE

1. Leave this blank (for office use only) (DUP. ON EVERY CARD) Date of your visit: mo. day yr.

2. Name of supply Same as on inventory

3. Location Same as on inventory
post office common name, if different

4. Demands, MGD:

	PRESENT	10-YR. ESTIMATE	UNKNOWN
A. Avg. day	From		
B. Max. day	Plant		
C. Max. month	Records		

5. Water use has been restricted ___ times for a total of ___ days during any one year of the past 5 years.

6. LABORATORY CONTROL

A. Bacteriological (Distribution system only)

From Fig 1- D.W.S

(1) Min. number samples recommended per month by PHS DWS → UNKNOWN

(2) Avg. number/month for last 12 months

(3) Range of least and most monthly samples — May be zero

(4) Number of months the Drinking Water Standards were not met during the last 12 months for: No. of months

END CARD DUP 1

(a) Quality — Sec 3.2 - D.W.S.

(b) Number of samples {Months when sample numbers < no. in 6.A.(1)

(c) NONE collected No samples for ___ months.

From plant records

(5) Are samples representative of distribution system? Judge from map of distribution system. yes no

(6) Are check samples collected as provided for in the Drinking Water Standards? Sec 3.15 - D.W.S. yes no

(7) Are samples requiring check samples reported by telephone? yes no

(8) Is the laboratory certified? yes no

(a) Within the past 3 years? yes no

(b) If yes to one or both, by whom was it certified. State PHS

Information from operator

(9) Are samples received by lab within 30 hours? yes no

ECA-19

B. Chemical (finished water only) 2

B(1)-(4) refer to Sec. 5.2-DWS.

(1) Samples of finished water are analyzed each ☐ month, ☐ year, ☐ 2 years, ☐ 3 years, ☐ infrequently ☐ never.

(2) Type of analysis: ☐ complete (DWS) everything ☐ partial. If any constituent missed

(3) Date of last chemical analysis ☐☐ mo. ☐☐ day ☐☐ yr.

(4) Analyzed by ☐ utility, ☐ state, ☐ PHS, ☐ university, ☐ other.

(5) Tests run for operational control and their frequency are:

Tests	Frequency: Continuous	Each shift	Daily	Weekly	Less frequently than weekly
Alkalinity	☐	☐	☐	☐	☐
Aluminum	☐	☐	☐	☐	☐
Chloride	☐	☐	☐	☐	☐
Chlorine residual	☐	☐	☐	☐	☐
(END CARD TWO) ☐ 80 Color	☐	☐	☐	☐	☐
Fluoride	☐	☐	☐	☐	☐
Hardness	☐	☐	☐	☐	☐
Iron	☐	☐	☐	☐	☐
Jar tests	☐	☐	☐	☐	☐
Manganese	☐	☐	☐	☐	☐
pH	☐	☐	☐	☐	☐
Taste & Odor	☐	☐	☐	☐	☐
Turbidity	☐	☐	☐	☐	☐
Zeta potential	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐

Note other frequencies

C. Radioactivity

(1) Samples are analyzed each ☐ month, ☐ year, ☐ 2 years, ☐ 3 years, ☐ infrequently ☐ never. (END CARD 3) ☐ 80

(2) Date of last radiological analysis ☐☐ mo. ☐☐ day ☐☐ yr.

(3) Analyzed by ☐ utility, ☐ state, ☐ PHS, ☐ university, ☐ other. (specify)

7. SANITARY SURVEY

A. Date of most recent survey [ ][ ] mo. [ ][ ] day [ ][ ] yr. By others - Not of this one

B. Survey made by: [ ] 31 state, [ ] 32 PHS, [ ] 33 local health department, [ ] 34 utility, [ ] 35 consultant. "Survey" requires written report of findings

C. Facilities surveyed: [ ] 36 source, [ ] 37 transmission, [ ] 38 treatment, [ ] 39 storage, [ ] 40 distribution.

8. FACILITIES & OPERATION (describe deficiencies on reverse side)

	YES	NO
A. Are there common walls between finished and lesser quality water?	[ ] 41	[ ] 42
B. Are there inter-connections to other "systems" {Sub-divisions, private industrial, community indicated by state health dept acceptance.	[ ] 43	[ ] 44
(1) of known acceptable quality		
(2) of unknown quality		
(a) with protection Note how protected	[ ] 45	[ ] 46
(b) without protection	[ ] 47	[ ] 48
C. Is there a cross-connection control program		
(1) on new construction only	[ ] 49	[ ] 50
(2) for continuous re-inspection	[ ] 51	[ ] 52
D. Are finished water reservoirs properly covered?	[ ] 53	[ ] 54
E. Is there detectable chlorine residual in distant parts of the distribution system?	[ ] 55	[ ] 56
F. Can the treatment plant be by-passed?	[ ] 57	[ ] 58
G. Are there satisfactory procedures to:		
(1) prevent personal accidents	[ ] 59	[ ] 60
(2) prevent chlorine accidents	[ ] 61	[ ] 62
(3) disinfect all new and/or repaired distribution system mains, valves, fittings, including check samples before being placed in service?	[ ] 63	[ ] 64
H. Are there areas of low pressure (< 20 psi) in the distribution system under maximum water use?	[ ] 65	[ ] 66

I. Operating problems most often encountered are: [ ] 67 taste & odor [ ] 68 phenols, [ ] 69 corrosive water, [ ] 70 short filter runs, [ ] 71 other, specify.

8. FACILITIES & OPERATION, continued

J. Chlorination process was interrupted [ ][ ] (72 73) times in the last 12 months.

(1) Interruptions were due to: [ ] (74) chlorinator failure, [ ] (75) feedwater pump, [ ] (76) changing cylinders, [ ] (77) power failure, [ ] (78) other, explain.

(END CARD 4) [4] (80)

K. Percent of land area within service area where water is available (nearest whole percent) [ ][ ][ ] (13 15) %.

L. Were plans and specs. for treatment plant approved by the state? YES [ ] (16) NO [ ] (17)

9. SOURCE, TREATMENT & DISTRIBUTION (describe deficiencies on reverse side) Note

A. Are the following adequate:

	YES	NO
(1) Source, with respect to the following:		
(a) quantity	[ ] (18)	[ ] (19)
(b) bacteriological quality } Refer to PHS No. 1820	[ ] (20)	[ ] (21)
(c) chemical quality } Refer to PHS No. 1820	[ ] (22)	[ ] (23)
(d) physical quality } Refer to PHS No. 1820	[ ] (24)	[ ] (25)
(e) adequate protection	[ ] (26)	[ ] (27)
(2) Transmission of raw water	[ ] (28)	[ ] (29)
(3) Is the raw water sampled for:		
(a) Bacteriological contamination	[ ] (30)	[ ] (31)
(b) Chemical contamination	[ ] (32)	[ ] (33)
(4) Treatment, with respect to the folowing:		
(a) aeration	[ ] (34)	[ ] (35)
(b) chemical feed, capacity	[ ] (36)	[ ] (37)
(c) chemical feed, stand-by equipment	[ ] (38)	[ ] (39)
(d) chemical mixing	[ ] (40)	[ ] (41)
(e) flocculation	[ ] (42)	[ ] (43)

9. SOURCE, TREATMENT & DISTRIBUTION, continued

A. Are the following adequate (continued):

	YES	NO
(4) Treatment, continued:		
(f) settling	44	45
(g) recarbonation	46	47
(h) filtration At normal operating rates	48	49
(i) disinfection, capacity	50	51
(j) disinfection, stand-by equipment	52	53
(k) taste & odor control	54	55
(l) fluoridation	56	57
(5) Distribution, with respect to the following:		
(a) storage	58	59
(b) booster chlorination	60	61
(c) high service pumping	62	63
(d) booster pumping	64	65
(e) pressure	66	67
(6) Maintenance	68	69
(7) Records for:		
(a) disinfection	70	71
(b) filter runs	72	73
(c) chemical consumption	74	75
(d) operational control tests	76	77
(e) bacteriological examinations	78	79
(8) Cross-connection control	END CARD 5	5 80
(a) ordinance	12	13
(b) program implementation	14	15
(c) progress	16	17

9. SOURCE, TREATMENT & DISTRIBUTION, continued

B. During the past 3 years, raw water quality has ☐ 19 improved, ☐ 20 deteriorated, or ☐ 21 stayed the same.

10. PERSONNEL

A. Water Purification Operator This is the responsible plant operator - Not supt.

(1) Highest level of formal education: ☐ 22 8th grade or less, ☐ 23 high school, ☐ 24 technical or trade school, ☐ 25 university.

(2) Level of training in water treatment: ☐ 26 college course, ☐ 27 technical or trade school, ☐ 28 short school, ☐ 29 on the job, ☐ 30 none, ☐ 31 other, specify _____.

(3) Length of time on this job: ☐☐ 32 33 years, ☐☐ 34 35 months.

(4) Number of previous positions as water treatment operator ☐☐ 36 37

(5) Total years of water purification experience ☐☐ 38 39

(6) Level of study in sanitary microbiology: ☐ 40 college course, ☐ 41 technical or trade school, ☐ 42 short school, ☐ 43 on the job, ☐ 44 none, ☐ 45 other, specify _____.

(7) Level of study in water chemistry: ☐ 46 college course, ☐ 47 technical or trade school, ☐ 48 short school, ☐ 49 on the job, ☐ 50 none, ☐ 51 other, specify. _____.

(8) Is the operator a full-time employee? ☐ 52 yes ☐ 53 no

(9) Salary range (per year) of operator: ☐ 54 <$1,999 ☐ 55 $2,000-4,999 ☐ 56 $5,000-7,499 ☐ 57 $7,500-9,999 ☐ 58 $10,000

Get operator data for each supply even if no treatment.

10. PERSONNEL, continued

A. continued

(10) Is your present staff adequate in: Operator's opinion

(a) number ☐ yes (60) ☐ no (61)

(b) quality ☐ yes (62) ☐ no (63)

B. Operator's major complaint _____

C. Most frequent customer's complaint: Received by utility.

D. Management's most frequent complaint: _____

11. FINANCIAL INFORMATION

A. Bonded indebtedness: (water supply)

(1) General obligation bonds $ [ ]. END CARD 6 [6] 80

(a) statutory limit $ [ ].

(2) Revenue bonds $ [ ].

(a) statutory limit $ [ ].

B. Capital stock, par value $ [ ].

bonds, par value $ [ ].

C. Water funds are [ ] kept separate or [ ] mingled with other funds.

D. Is there an annual payment to the general fund? [ ] yes [ ] no

E. Operation is controlled by: [ ] mayor-council, [ ] mayor-commission, [ ] independent water board, [ ] other; specify. _____

For city, district, etc owned only

F. Is there active planning for expansion or improvement? [ ] yes [ ] no

(1) Value of planned improvement $ [ ].

(2) Planning by utility [ ] yes [ ] no utility only

(3) Planning by consultants [ ] yes [ ] no utility & consultants

END CARD 7 [7] 80

G. If expansion is planned, it will be carried out within:

	1 YR.	2-5 YRS.	6-10 YRS.
(1) Source	[ ]	[ ]	[ ]
(2) Treatment	[ ]	[ ]	[ ]
(3) Distribution	[ ]	[ ]	[ ]
(4) Other _____	[ ]	[ ]	[ ]

H. Costs of production:

	CENTS/1,000 GALLONS
(1) Chemicals	[ ][ ].[ ]
(2) Labor, power, etc.	[ ][ ].[ ]
(3) Depreciation	[ ][ ].[ ]
(4) Other, including office, administration, meter reading, collection, etc.	[ ][ ].[ ]
(5) Total	[ ][ ].[ ]

11. FINANCIAL INFORMATION, continued

1. Tariff (Residential)

(1) Connection fee $ [41] [42] [43] [44].

(2) Sales unit is [45] per 1,000 gallons or [46] per 100 cu. ft.

(a) [47] [48] [49] cents for the first [50] [51] units

(b) [52] [53] [54] cents for the next [55] [56] units

(c) [57] [58] [59] cents for the next [60] [61] units

(d) etc. as needed to cover steps.

Adjust all rates to these units.

END CARD 8 [8] [80]

Note flat rate here as $/time unit

UNITED STATES PUBLIC HEALTH SERVICE
ENVIRONMENTAL CONTROL ADMINISTRATION
BUREAU OF WATER HYGIENE

-11-

SERIAL NO 911

PUNCH IN COL.

IDENTIFICATION OF WATER SAMPLE

LOCATION OF WATER SUPPLY Same as on inventory
CITY, COUNTY, STATE

FOR BUREAU USE ONLY

WATER SUPPLY NAME Same as on inventory

DATE OF SAMPLING — BEGINNING DATE OF COMPOSITE MO. DAY — ENDING DATE OF COMPOSITE OR DATE OF GRAB SAMPLE MO. DAY YR.

SAMPLE FROM: [ ] TREATMENT PLANT [ ] WELL [ ] RESERVOIR [ ] DISTRIBUTION SYSTEM [ ] OTHER

SAMPLING POINT LOCATION AND OR DESCRIPTION ie. kitchen, 1234 Main

TYPE OF WATER SAMPLED: [ ] FINISHED [ ] PARTIALLY TREATED [ ] RAW [ ] OTHER

SOURCE OF WATER: [ ] SURFACE [ ] GROUND [ ] COMBINED [ ] OTHER

SAMPLING METHOD: [ ] COMPOSITE [ ] GRAB [ ] OTHER

ANALYSIS REQUIRED: [ ] ORGANIC [ ] TRACE ELEMENTS [ ] WET [ ] RADIO-CHEMICAL [ ] OTHER

WATER SUPPLY CATEGORY: [ ] COMMUNITY WATER SUPPLY [ ] LOWS [ ] FEDERAL INSTALLATION [ ] SPECIAL STUDY [ ] OTHER

APPEARANCE OF SAMPLE _____

ADDITIONAL REMARKS _____

COLLECTED BY _____ [ ] PW TEST [ ] OTHER

DO NOT WRITE BELOW THIS LINE

LAB. SAMPLE NO. _____ DATE RECEIVED _____

LABORATORY REMARKS

Reproduced from best available copy.

SEE FOR INSTRUCTIONS

INSTRUCTIONS: EVERY ITEM OF INFORMATION REQUIRED FROM THE SAMPLER IS NUMBERED (1 THROUGH 13). THESE ARE THE ONLY RESPONSES THE SAMPLER SHOULD MAKE. NOTE AREAS MARKED "DO NOT WRITE BELOW THIS LINE" AND "FOR OFFICE USE ONLY."

ITEM 1 SHOULD BE THE LOCATION OF THE WATER SUPPLY FACILITY WHICH PRODUCED THE WATER FOR THE SAMPLE. (EXAMPLE: CINCINNATI, HAMILTON, OHIO.)

ITEM 2 SHOULD BE THE FULL NAME OF THE WATER SUPPLY FACILITY. (EXAMPLE: CINCINNATI MUNICIPAL WATER WORKS)

ITEMS 4, 6, 7, AND 8 - CHECK THE BOX WHICH APPLIES

ITEMS 9 AND 10 - CHECK ONE OR MORE BOXES AS NECESSARY

ITEMS 3, 5, 11, 12, AND 13 SHOULD BE SELF-EXPLANATORY

ANY RESPONSE OF "OTHER" OR "SPECIAL STUDY" SHOULD BE EXPLAINED UNDER ITEM 12 - ADDITIONAL REMARKS.

IF NECESSARY FOR COMPLETE IDENTIFICATION OR EXPLANATION, PLEASE FEEL FREE TO USE THE BACK OF THE ORIGINAL (WHITE) COPY OR ATTACH AN ADDITIONAL PAGE OF LIKE SIZE.

DISTRIBUTION:

MAIL ORIGINAL (WHITE COPY) TO:

WATER QUALITY REGISTER BRANCH
BUREAU OF WATER HYGIENE
222 E. CENTRAL PARKWAY
CINCINNATI, OHIO 45202

BLUE	ENCLOSED WITH ORGANIC SAMPLE
PINK	ENCLOSED WITH TRACE METAL SAMPLE
YELLOW	ENCLOSED WITH WET CHEMISTRY SAMPLE
GREEN	ENCLOSED WITH RADIOCHEMICAL SAMPLE
TAN	RETAINED BY REGIONAL OFFICE OR SAMPLER

UNITED STATES PUBLIC HEALTH SERVICE
ENVIRONMENTAL CONTROL ADMINISTRATION
BUREAU OF WATER HYGIENE

SERIAL NO. 9111

PUNCH IN COLS. 1 6

IDENTIFICATION OF WATER SAMPLE

1. LOCATION OF WATER SUPPLY _____
CITY, COUNTY, STATE

FOR OFFICE USE ONLY (7 – 18)

2. WATER SUPPLY NAME _____

DO NOT WRITE BELOW THIS LINE

3. DATE OF SAMPLING — BEGINNING DATE OF COMPOSITE (MO. DAY) (19 – 22) — ENDING DATE OF COMPOSITE OR DATE OF GRAB SAMPLE (MO. DAY YR.) (23 – 28)

4. SAMPLE FROM: ☐ TREATMENT PLANT (8) ☐ WELL (4) ☐ RESERVOIR (2) ☐ DISTRIBUTION SYSTEM (1) ☐ OTHER (0) — (29)

5. SAMPLING POINT LOCATION AND/OR DESCRIPTION _____ (30 – 32)

6. TYPE OF WATER SAMPLED: ☐ FINISHED (8) ☐ PARTIALLY TREATED (4) ☐ RAW (2) ☐ OTHER (0) — (33)

7. SOURCE OF WATER: ☐ SURFACE (8) ☐ GROUND (4) ☐ COMBINED (2) ☐ OTHER (0) — (34)

8. SAMPLING METHOD: ☐ COMPOSITE (8) ☐ GRAB (4) ☐ OTHER (0) — (35)

9. ANALYSIS REQUIRED: ☐ ORGANIC (8) ☐ TRACE ELEMENTS (4) ☐ WET (2) ☐ RADIO-CHEMICAL (1) ☐ OTHER (0) — (36)

10. WATER SUPPLY CATEGORY: ☐ COMMUNITY WATER SUPPLY (8) ☐ ICWS (4) ☐ FEDERAL INSTALLATION (2) ☐ SPECIAL STUDY (1) ☐ OTHER (0) — (37 – 39)

11. APPEARANCE OF SAMPLE _____

12. ADDITIONAL REMARKS _____

13. COLLECTED BY _____ ☐ USPHS STAFF ☐ OTHER — (1) (80)

DO NOT WRITE BELOW THIS LINE

LAB. SAMPLE NO. _____ DATE RECEIVED _____

LABORATORY REMARKS

OVER FOR INSTRUCTIONS

106

GLOSSARY

Back Flow -- The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. Back siphonage is one type of backflow.

Back Flow Connection -- Any arrangement whereby backflow can occur.

Back Siphonage -- The flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel or other sources into a water supply pipe due to a negative pressure in such pipe.

Bad sample -- A bacteriological sample that showed the presence of coliform bacterial contamination.

Consumer -- One person using the water for domestic and culinary purposes.

Cross Connection -- Any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other either water of unknown or questionable safety, or steam, gas, or chemical, whereby there may be a flow from one system to the other, the direction of flow depending on the pressure differential between the two systems. See Backflow and Back siphonage.

Fecal Coliform Bacteria -- That portion of the total coliform population which are capable of lactose fermentation at an elevated temperature of 44.5°C. Unlike some strains of the non-fecal members of the total coliform group, fecal coliforms have a specific high order of positive correlation with warm-blooded animal pollution, survive for a shorter time in water and soil, and more closely correlate with survival patterns of enteric pathogenic bacteria.

Good Sample-- A bacteriological sample that did not show the presence of coliform bacterial contamination.

Inter-Connection -- A connection between the water supply and one or more additional sources of water not under the jurisdiction or control of the water supply operator.

Mandatory Limit -- The upper limit of density of coliform bacteria as described in Section 3.23, as modified below, of the concentration of certain ions as described in Section 5.22 and 5.23 and of radioactivity as described in Section 6.22, Public Health Service Drinking Water Standards, 1962 (PHS Publication No. 956). For these samples collected for this study, the bacterial limit was exceeded if the arithmetic average was more than 1 coliform per 100 ml. Also, for this study the total chromium concentration was considered to be hexavalent chromium.

Persons Served -- The aggregate number of consumers.

Plate Count --A measure of the general bacterial population present in the water sample as described in Standard Methods for the Examination of Water and Wastewater, 12th Ed. These bacteria will produce colonies on plate count agar in 48 hours when incubated at 35 C. (95 F.).

Recommended Limit -- The upper limit of concentration of turbidity, color, chemicals, and radioactivity as described in Sections 4.2, 5.21, and 6.21, PHS Drinking Water Standards 1962 (PHS Publication No. 956).

Responsible Operator -- The operator at the treatment plant responsible for the day to day operation of the treatment facilities. Where there is no treatment, the person responsible for the operation of the system.
He is not necessarily the water superintendent.

Service Connection -- A physical connection to a water main for the purpose of conveying water to a building or onto a premise for use.

Standard Metropolitan Statistical Area -- The boundaries and titles of standard metropolitan statistical areas are established by the Bureau of the Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas. This Committee is composed of representatives of the major statistical agencies of the Federal Government. In applying the following criteria, data from the following sources are used by the Committee:

Population, labor force, density, and occupational data: Bureau of the Census and Bureau of Employment Security.

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